Highly Sensitive E. coli Bacteria Detection through the Integration of Gold Nanodisk Plasmon Resonance and Antibody-Antigen Binding

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Certain strains of Escherichia coli bacteria that may exist in food items such as milk, juices, or meats, possess a major health threat to the general public. In this project, a highly sensitive E. coli bacteria biosensor based on nanoplasmonic technology and antibody-antigen (E. coli) binding was demonstrated. The biosensor detects the presence of E. coli bacteria through the measurement of the localized surface plasmon resonance (LSPR) shift caused by E. coli binding on the gold nanodisks. In order to immobilize the E. coli, anti-E. coli antibodies were first linked onto the gold nanodisk surface through the utilization of a self-assembling monolayer and then solutions at successive concentrations containing E. coli k-12 bacteria were washed over the surface of the gold nanodisks. The E. coli bacteria in the solutions bind onto the gold nanodisks through antibody-antigen reaction. The new nanotechnology biosensor allows for the achievement of immediate results, as opposed to the time-consuming and laborious traditional method of detecting foodborne bacteria that requires growth in culture media. Also the results of the new biosensor measurement were compared with results using traditional electric impedance measurement technique.

Awards Won:

Third Award of $1,000