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Title	Detection Limit of Surface Plasmon Resonance Sensor for Quantitative Foodborne E.coli Detection Using Effective Refractive Index Theory
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Abstract

Surface plasmon resonance has been a gold standard for label-free biomedical and biochemical measurements, such as protein binding kinetics, protein-protein interactions. The surface plasmon resonance has also been utilized in food safety screening, including Escherichia coli and Salmonella detection. The theory of surface plasmon resonance has been well established and demonstrated its ultra-sensitivity to detect small nucleotides, proteins, and molecules. However, the results, so far, for the E.coli detection under the surface plasmon resonance have not shown an impressive detection limit. The typical detection limit of E.coli under the conventional surface plasmon detection platform is around 103 CFU/ml. The detection limit can be enhanced using a secondary binding agent to E.coli, including conjugated nanoparticles. Here, we propose a theoretical framework using effective refractive index theory to explain the detection mechanism and give an insight into the underlining obstacles that degrades the detection limit of the surface plasmon resonance.