Title	Nanobeads-based Biosensor for Rapid Detection of Pathogenic Bacteria in Poultry and Meat Samples
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Abstract

Magnetic nanobeads were coated with specific antibodies and used in both separation and detection of target pathogens in poultry and meat samples by use of an impedance immunosensor. Antibodies were immobilized on the surface of the magnetic nanobeads by use of streptavidin and biodin conjugation technique. *Salmonella Typhimurium* or *Escherichia coli* 0157:H7 were artificially inoculated into poultry and meat samples. After the sample was mixed with the magnetic immuno-nanobeads, target pathogens were separated by applying a magnetic field and washing away the rest. Then the magnetic nanobeads were sent to the biosensor, consisting of a gold microelectrode in a flow cell and an impedance detector. The microelectrode was immobilized with specific antibodies by the protein A method to capture the target pathogen bond with the magnetic nanobeads. The impedance value of the target pathogen with nanobeads was measured at 10 kHz and was correlated to the cell number of target pathogens in the food sample. The results showed that the magnetic immuno-nanobeads-based impedance immunosensor could detect *E. coli* 0157:H7 and *S. Typhimurium* in poultry and meat samples with a detection limit of 2×10^2 cells in 1 h. The detection range was from 10^2 to 10^6 cells/ml with a linear calibration line. The biosensor showed its advantages in highly efficient separation, sensitive detection, and enhanced automatic operation for detection of foodborne pathogens.