Sensitive detection of *Salmonella Typhimurium* with aptamer-modified nanozymes using porous silicon Fabry-Pérot interferometers

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Our work describes a portable biosensing approach for rapid and reliable Salmonella typhimurium (S. typhi) microorganisms detection in food products. The predominant bacteria is an essential contributor to the group of pathogens that significantly increase enteric fever or typhoid cases, thus it needs constant monitoring and assessment. Herein, we present a reflective-based approach to assess minute bacterial contamination by indirect aptamer-based assay coupled with biochemical signal amplification using catalytically active nanozymes (NiPt nanoparticles). The resulting insoluble biochemical reaction products infiltration into the porous interferometer composed of complementary strand modified porous Si Fabry-Pérot interferometers characterized with an impressive surface area of > 800 m^2/gr. The latter reaction was monitored in real time by alternating reflectance spectra in correlation to bacteria load. The developed sensing approach depicted several significant advantages for on-field analysis, such as high sensitivity, attractive dynamic range and rapid assessment. No enrichment process was involved in the pre-treatment procedure, which simplified the execution and practicality of the presented approach. Furthermore, besides being portable and low-cost, the developed interferometer is not constrained by external light (label-free transduction) while performing the assay outdoors. Finally, the presented proof-of-concept can be easily adapted for detecting other potent microorganisms in most complex media without hindering its spectral resolution.