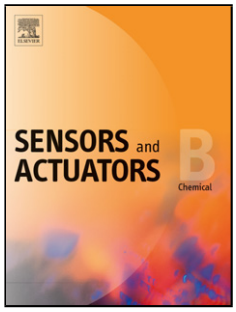

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An Optical and Rapid Sandwich Immunoassay Method for Detection of *Salmonella pullorum* and *Salmonella gallinarum* Based on Immune Blue Silica Nanoparticles and Magnetic Nanoparticles

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Abstract

An optical and rapid sandwich immunoassay of *Salmonella pullorum* and *Salmonella gallinarum* (*S. pullorum* and *S. gallinarum*) was designed using anti-*S. pullorum* and *S. gallinarum* antibody-functionalized blue silica nanoparticles (IgG-Blue-SiNPs) and magnetic nanoparticles (IgG-MNPs) as immunosensing probes in this article. The IgG-MNPs were used for enrichment of *S. pullorum* and *S. gallinarum*, IgG-Blue-SiNPs were used for signal amplification. The Blue-SiNPs were synthesized by doping C.I. reactive blue 14 into silica nanoparticles using an inverse microemulsion method. The morphology, surface charge and functional groups of Blue-SiNps were characterized by SEM, Zeta potential and FTIR spectroscopy. *S. pullorum* and *S. gallinarum* in sample solution was captured, enriched and separated by IgG-MNPs. Then IgG-Blue-SiNps were added into the above mixture solution, *S. pullorum* and *S. gallinarum* was sandwiched by IgG-MNPs and IgG-Blue-SiNps, forming a blue plaque. Under optimal conditions, the detection limit for pure *S. pullorum* and *S. gallinarum* was from 8.8×10^1. The detection limit for *S. pullorum* and *S. gallinarum* in milk powder was 8.8×10^2 CFU/ml. Besides, this qualitative detection method was economic, simple, rapid, specific and good stability. Such a simple optical sandwich immunoassay holds great potential as an on-site tool for clinical diagnosis of bacteria and viruses.

Keywords: Optical Sandwich immunoassay, Blue silica nanoparticles, magnetic nanoparticles, *Salmonella pullorum* and *Salmonella gallinarum.*

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