

Supporting Information

For

**Nanozyme mediated dual-immunoassay integrated with smartphone for use in
simultaneous detection of pathogens**

Nan Cheng^{1,2,3}, Yang Song¹, Mohamed M.A. Zeinhom^{1,4}, Yu-Chung Chang¹, Lina Sheng⁵, Haolin Li³, Dan Du¹,
Lei Li¹, Mei-Jun Zhu⁵, Yunbo Luo^{2,3}, Wentao Xu^{2,3*} and Yuehe Lin^{1*}

¹School of Mechanical and Materials Engineering, Washington State University, Pullman, Washington 99164, USA

²Beijing Advanced Innovation Center for Food Nutrition and Human Health, College of Food Science & Nutritional Engineering, China Agricultural University, Beijing 100083, China

³Beijing Laboratory for Food Quality and Safety, College of Food Science and Nutritional Engineering, China Agricultural University, Beijing 100083, China

⁴Food Hygiene Department, Faculty of Veterinary Medicine, Beni-Suef University, Beni-Suef 62512, Egypt.

⁵School of Food Science, Washington State University, Pullman, Washington 99164, USA.

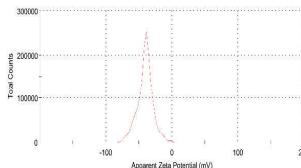
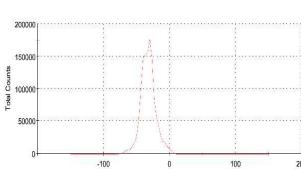
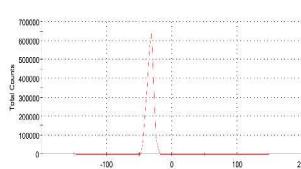
* To whom correspondence should be addressed.

Wentao Xu: xuwentao@cau.edu.cn

Yuehe Lin: yuehe.lin@wsu.edu

Supplementary tables

Table S1 Characterization of Pt-Pd nanoparticle, *Salmonella* Enteritidis antibody modified Pt-Pd nanoparticle conjugations and *E. coli* O157:H7 antibody modified Pt-Pd nanoparticle conjugations by means of zeta potential

Sample*	Typical Image	Zeta potential
Pt-Pd nanoparticle		$-40.6 \pm 1.7 \text{ mV}$
<i>Salmonella</i> Enteritidis antibody modified Pt-Pd nanoparticle conjugations		$-32.5 \pm 2.9 \text{ mV}$
<i>E. coli</i> O157:H7 antibody modified Pt-Pd nanoparticle conjugations		$-33.5 \pm 2.4 \text{ mV}$

* The samples were suspended in DI water at very low concentrations and the pH was kept constant at 8.2.

Supplementary figures

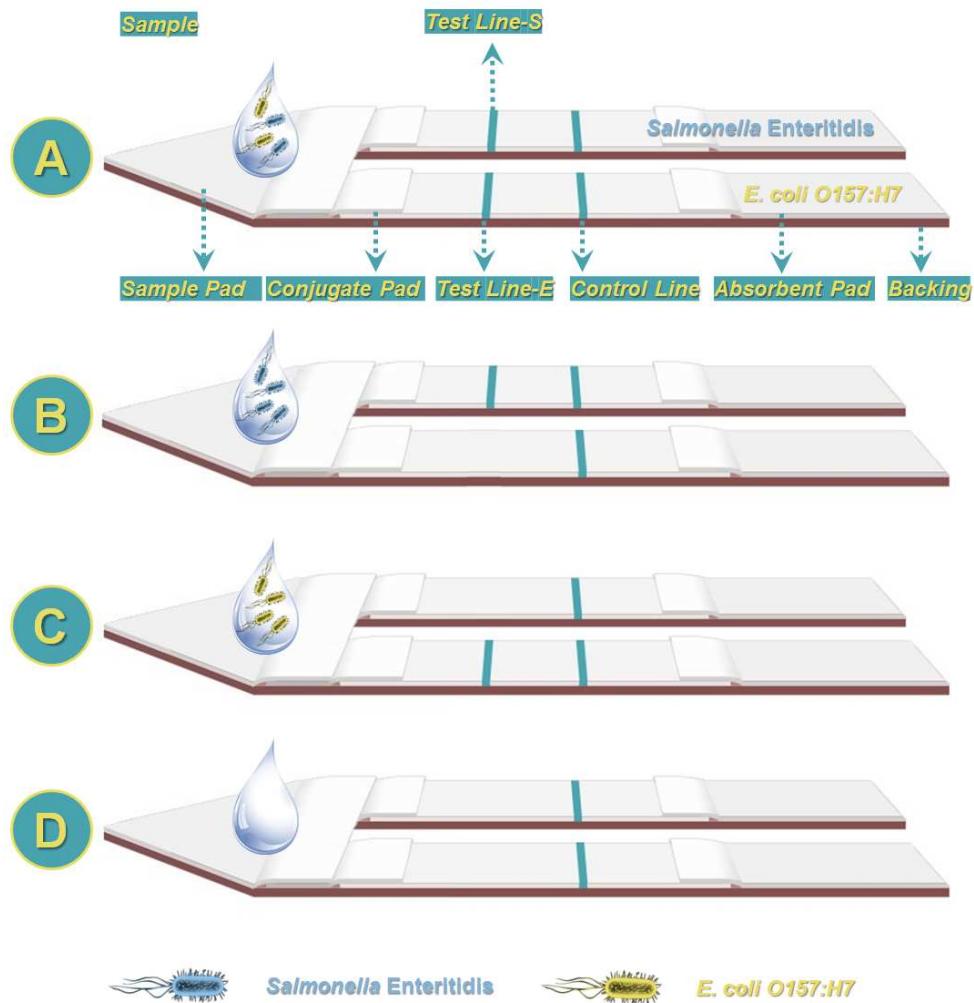


Figure S1. Blue signals on the lines. (A) Sample containing *Salmonella Enteritidis* and *E. coli O157:H7*. (B) Sample only containing *Salmonella*. (C) Sample only containing *E. coli O157:H7*. (D) Negative control.

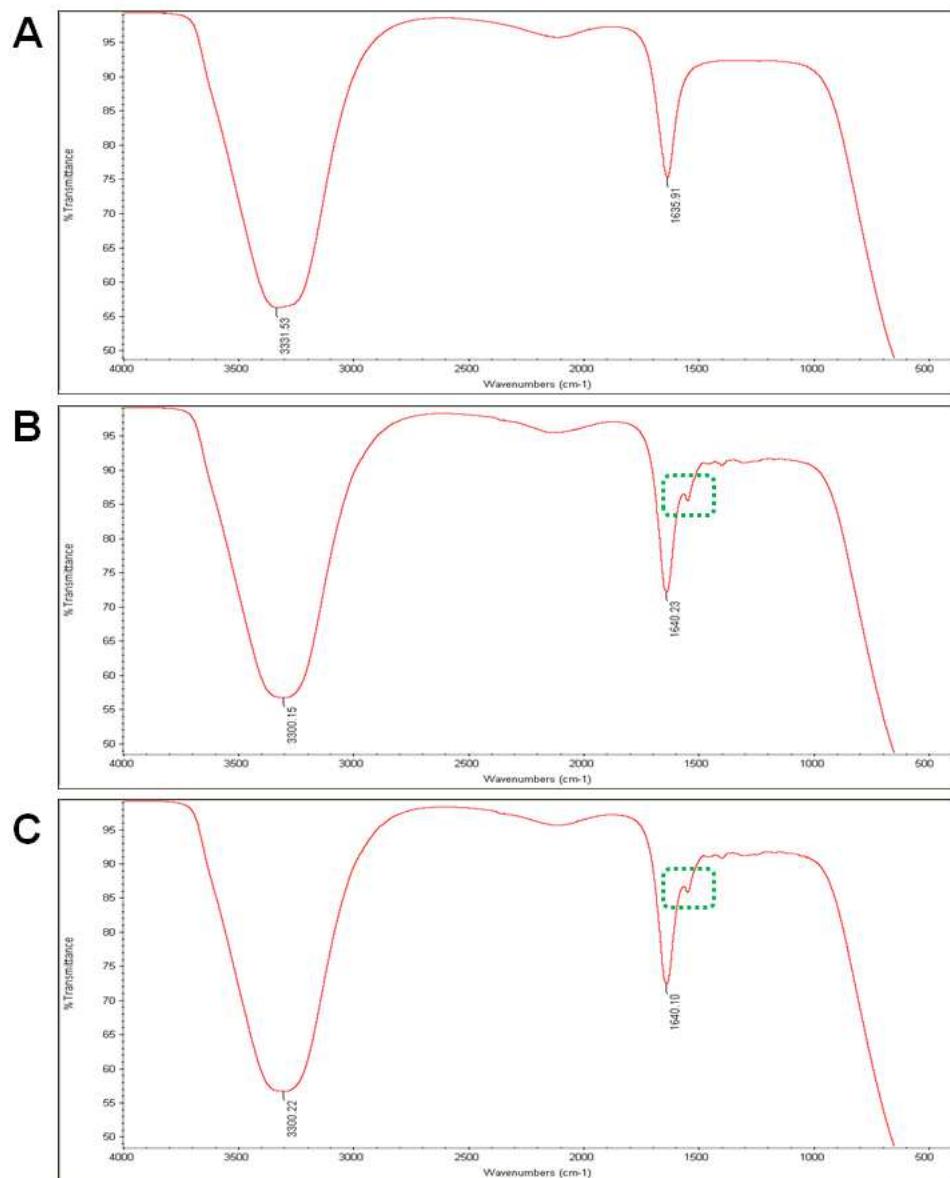


Figure S2. Characterization of nanoparticles by means of FTIR spectra. (A) Pt-Pd nanoparticle; (B) *Salmonella* Enteritidis antibody modified Pt-Pd nanoparticle conjugations; (C) *E. coli* O157:H7 antibody modified Pt-Pd nanoparticle conjugations.

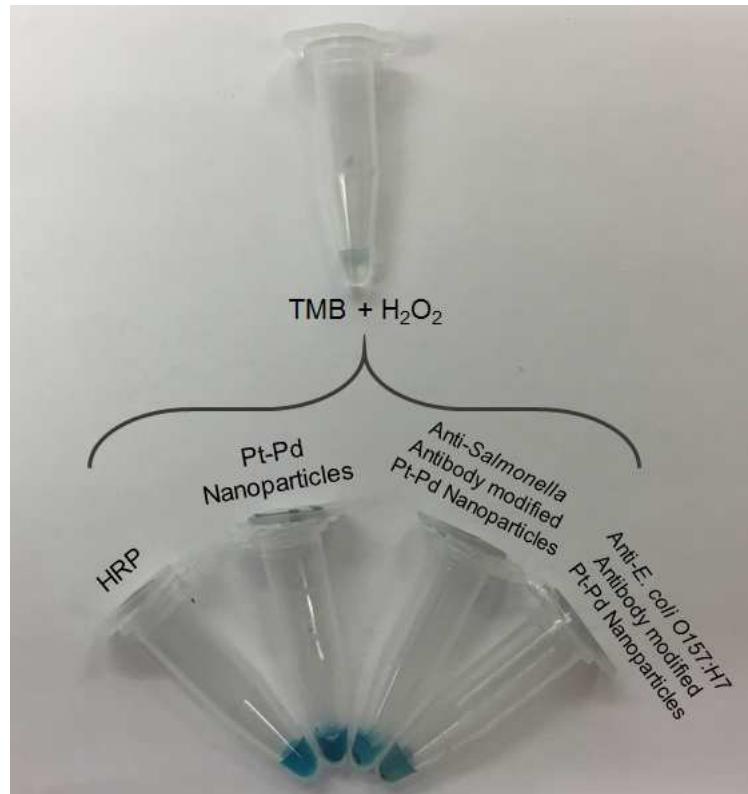


Figure S3. Catalytic function of Pt-Pd nanoparticle and antibody modified Pt-Pd nanoparticle conjugation.

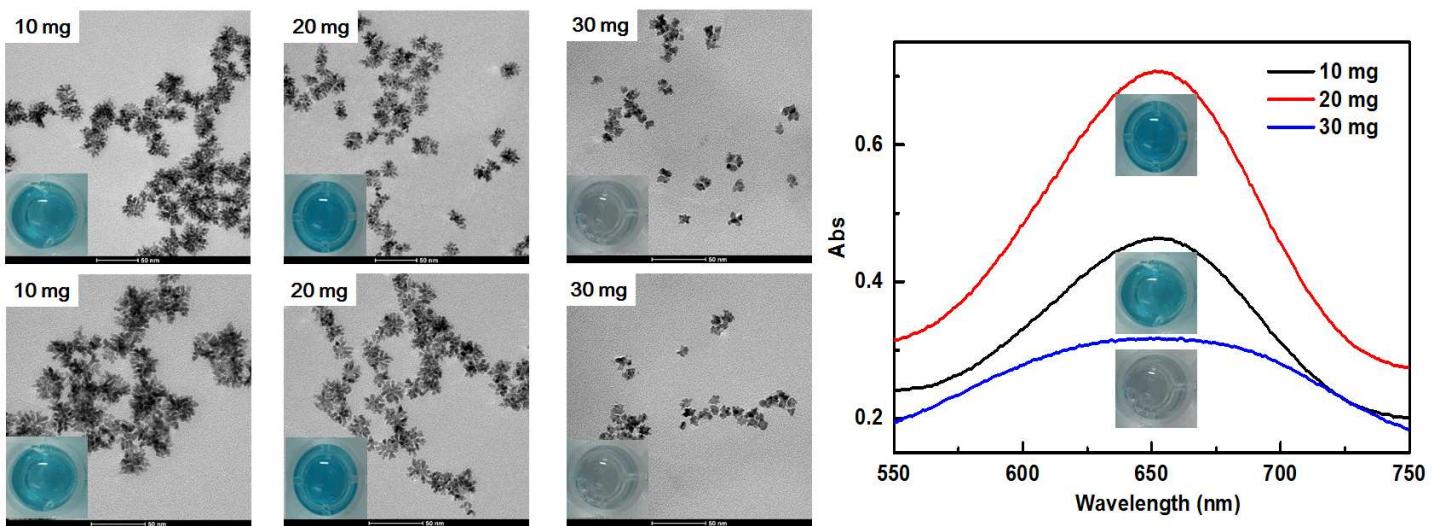


Figure S4. Particles size optimization with respect to TEM images and absorbance with TMB and H_2O_2 (50 μL).

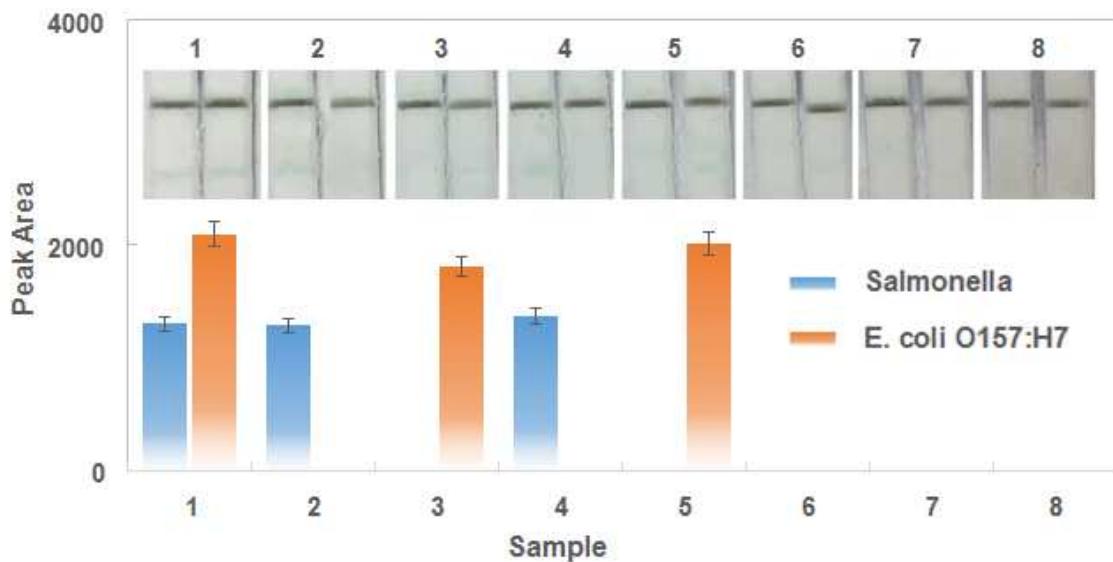


Figure S5. Specificity of dual-LFIA for detection of the corresponding sample solution. Typical images and Histogram with respect to peak area of test lines (*S* and *E*) via different samples. (1) mixture of 10^2 CFU/mL *Salmonella* and 10^2 CFU/mL *E. coli* O157:H7; (2) 10^2 CFU/mL *Salmonella*; (3) 10^2 CFU/mL *E. coli* O157:H7; (4) mixture of 10^2 CFU/mL *Salmonella* and 10^3 CFU/mL *Listeria*; (5) mixture of 10^2 CFU/mL *E. coli* O157:H7 and 10^3 CFU/mL *Staphylococcus aureus*; (6) 10^3 CFU/mL *Listeria*; (7) 10^3 CFU/mL *Staphylococcus aureus*; and (8) 1 × PBS. Error bars indicate standard deviations of three measurements.