Electronic Supplementary Information (ESI)

A combination of positive dielectrophoresis driven on-line enrichment and aptamer-fluorescent silica nanoparticles label for rapid and sensitive detection of *Staphylococcus aureus*

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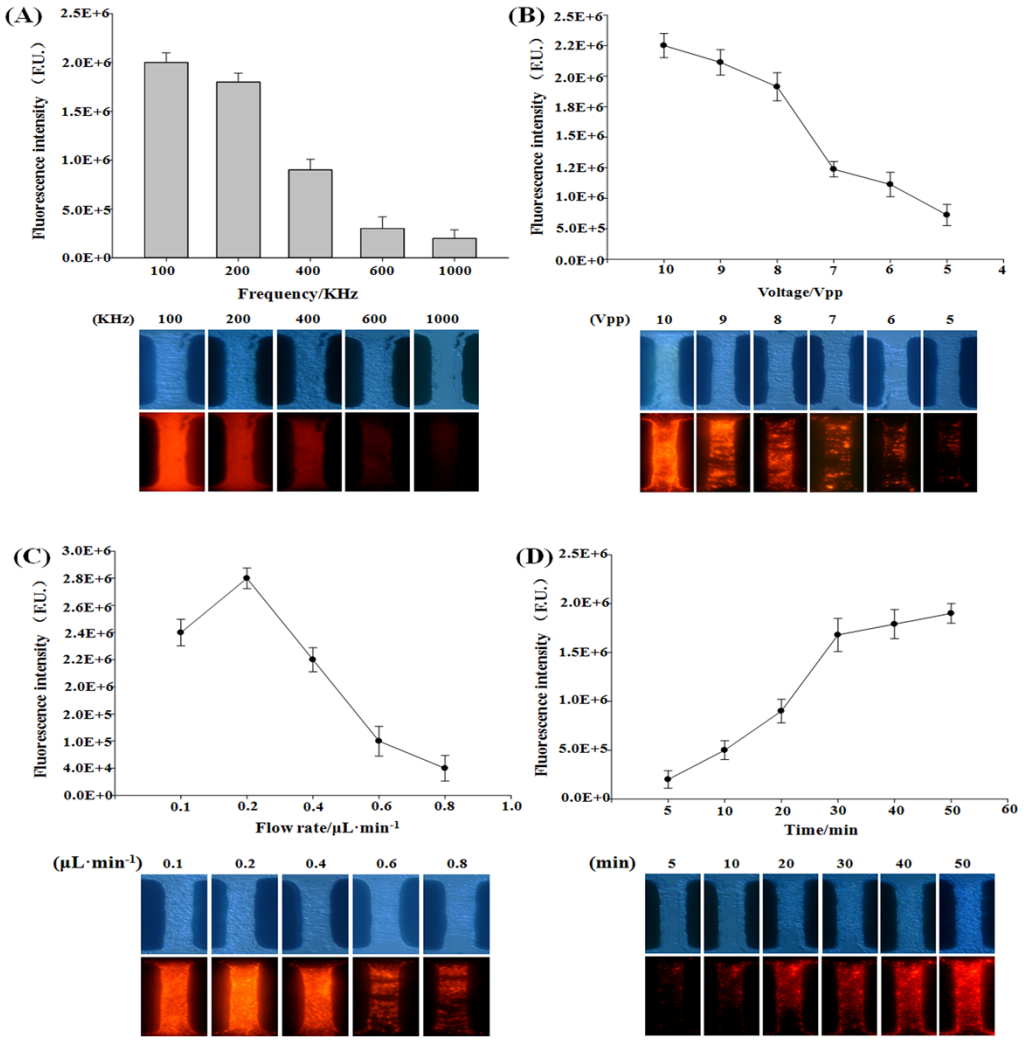

Fig. S1 Investigation of the influence factors for pDEP enrichment. (A). frequency (B). voltage (C). flow rate and (D). enriching time. 900μL dilutions of *S. aureus* suspended in DI water with concentration of 1×10^5 cfu mL^{-1} were incubated with $Apt_{S.aureus}$/FNPs (100μL, 5 mg mL^{-1}) for 40 min at 37ºC before introduced into the microchannel.

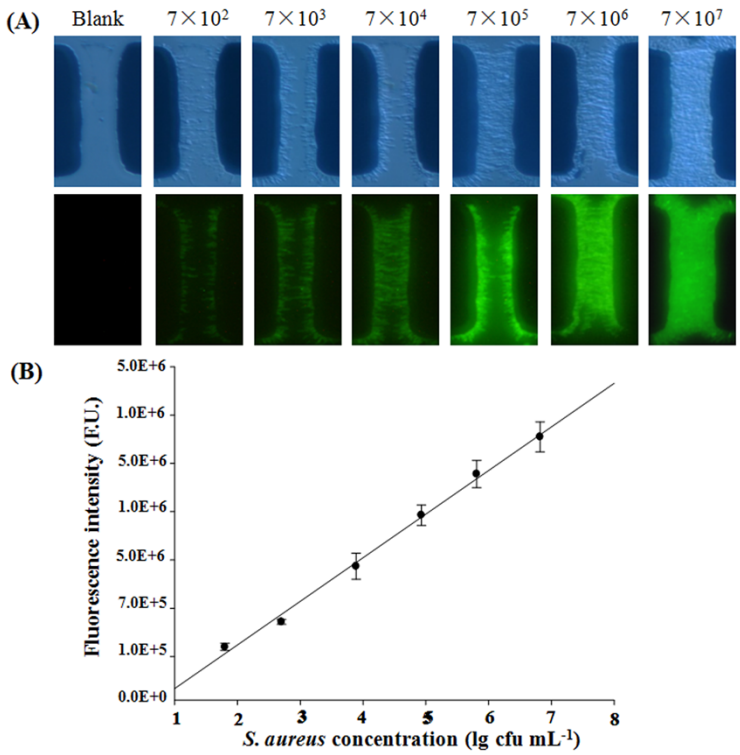

Fig. S2 Detection of *S. aureus* with pDEP enrichment and FITC-aptamer label. (A). The DIC and corresponding fluorescence image of different concentrations of FITC-aptamer incubated *S. aureus* at detection area captured by pDEP. The applied AC field was optimal conditions (100 KHz, 10 Vpp, 0.2 uL min^{-1} , 30 min). (B). The calibration curve of fluorescence intensity *vs. S. aureus* at different concentrations, the detection limit was 580 cfu mL^{-1}.

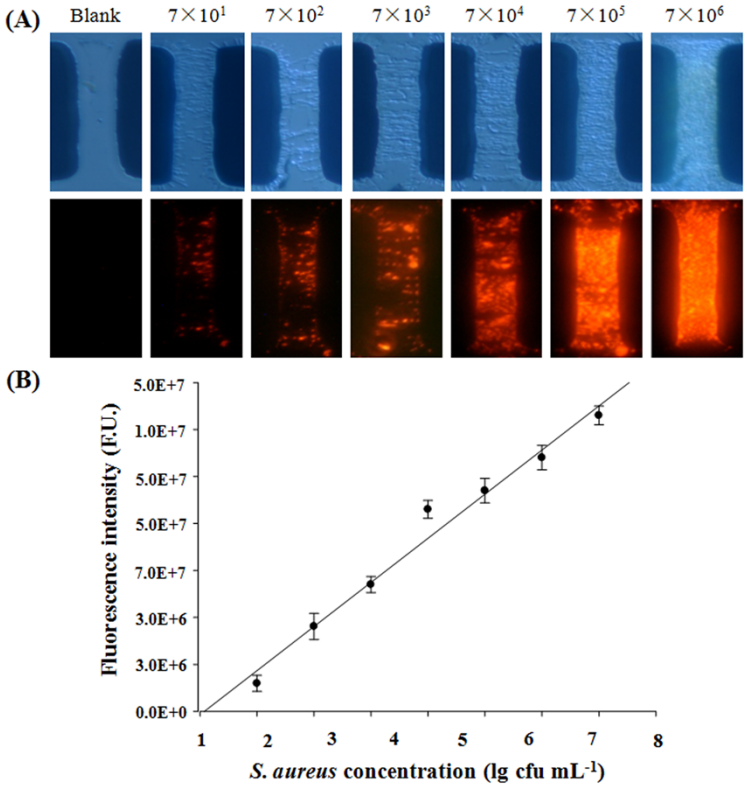

Fig. S3 The DIC and corresponding fluorescence image of detected *S. aureus* in spiked water by pDEP with different artificially concentrations. (A). The DIC and corresponding fluorescence image of different concentrations of $Apt_{S.aureus}$/FNPs labelled *S. aureus* at detection area captured by pDEP. (B). The calibration curve of fluorescence intensity *vs. S. aureus* at different concentrations, the detection limit was 270 cfu mL^{-1} The applied AC field was optimal conditions (100 KHz, 10 Vpp, 0.2 uL min^{-1} , 30 min)

Table. S1 Detection efficiencies of *S. aureus* in spiked water samples using pDEP enrichment and aptamer/FNPs bioconjugates label.

IC(cfu mL^{-1})	MC(cfu mL^{-1})	MC/IC(%)
7×10^2	$4.86\times10^2\pm1.92\times10^2$	69.4%
7×10^3	$5.60\times10^3\pm2.35\times10^3$	80%
7×10^4	$6.27\times10^4\pm1.29\times10^4$	89.6%
7×10^5	$6.80\times10^5\pm2.61\times10^5$	97.1%
7×10^6	$6.44\times10^6\pm2.65\times10^6$	92% av±RSD: 85.62±10

[a] Initial concentration (IC) of *S. aureus* in mineral water samples. Measured concentration (MC) of *S. aureus* by this method.