Supporting Information

Highly sensitive detection of prostate cancer specific PCA3 mimic DNA using SERS-based competitive lateral flow assay

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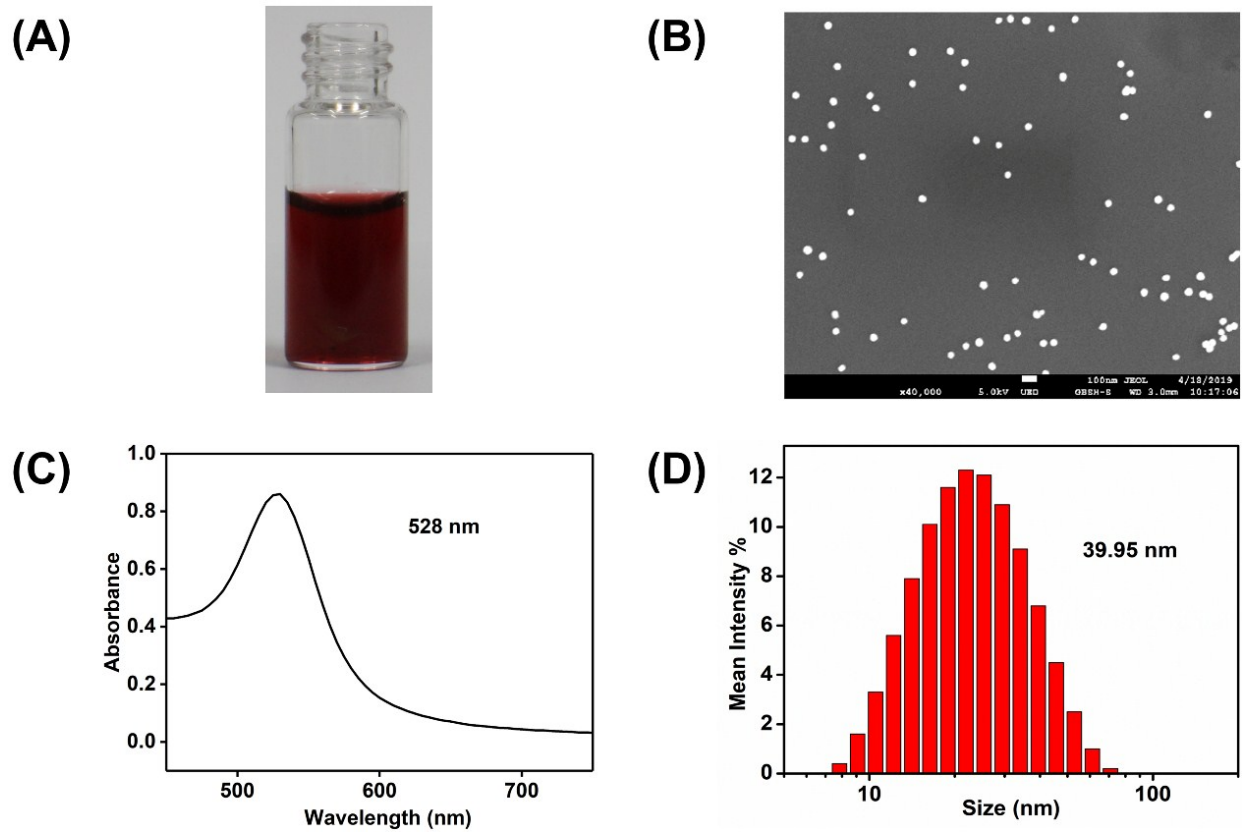

Fig. S1. (A) Photograph of AuNPs, (B) SEM image of AuNPs, (C) UV–vis spectra of AuNPs, (D) DLS date for the size distribution of AuNPs.

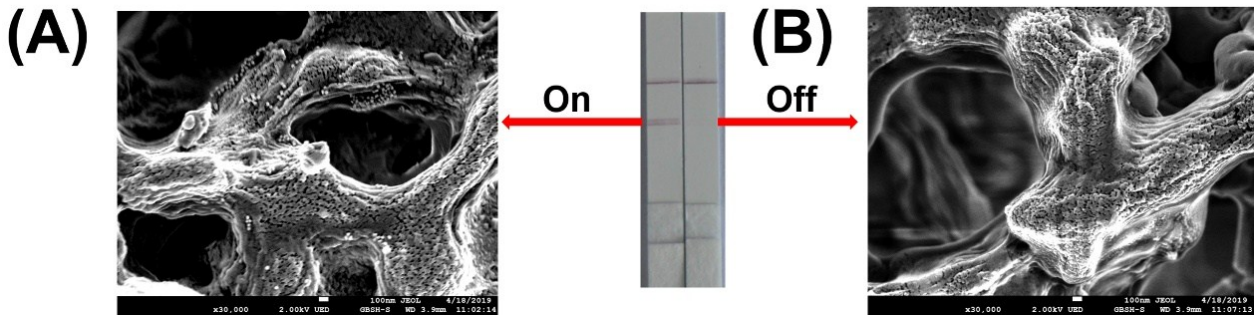

Fig. S2. Typical photographic image and SEM images of the SERS-based lateral flow strip in the absence (A, "On") and presence (B, "Off") of PCA3 mimic DNA.

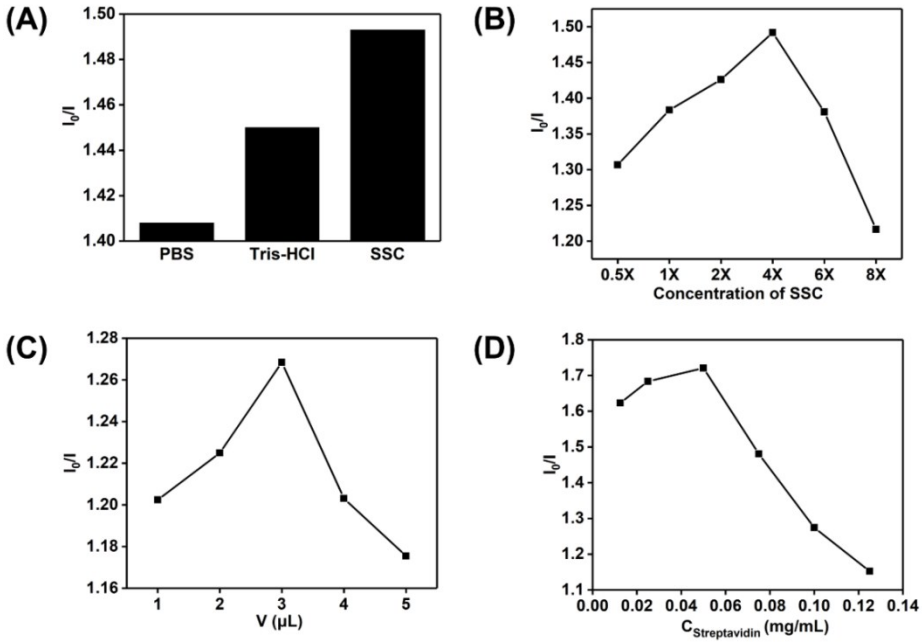

Fig. S3. (A) Effect of different types of running buffer: PBS, Tris-HCl and SSC; (B) Effect of the concentration of SSC buffer: 0.5×, 1×, 2×, 4×, 6×, and 8×; (C) Effect of the volume of reporter DNA conjugated SERS nano tags on the conjugated pad; (D) Effect of the concentration of capture probe on the test line: 0.0125 mg/mL, 0.025 mg/mL, 0.05 mg/mL, 0.075 mg/mL, 0.1 mg/mL, and 0.125 mg/mL. Concentration of PCA3 mimic DNA: 100 pM. Assay time: 15 min.

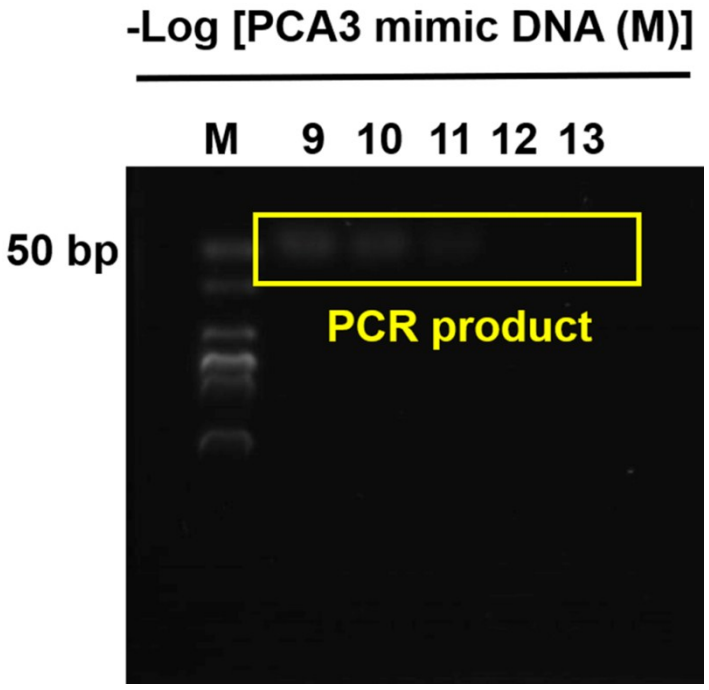

Fig. S4. The quantitative analysis of PCA3 mimic DNA through running agarose gel electrophoresis. The concentration of PCA3 mimic DNA was from 1 nM to 0.1 pM. The phase contrast band below 50 base pairs was corresponding to the PCR products of the target PCA3 mimic DNA. The LOD was estimated to be 10 pM.

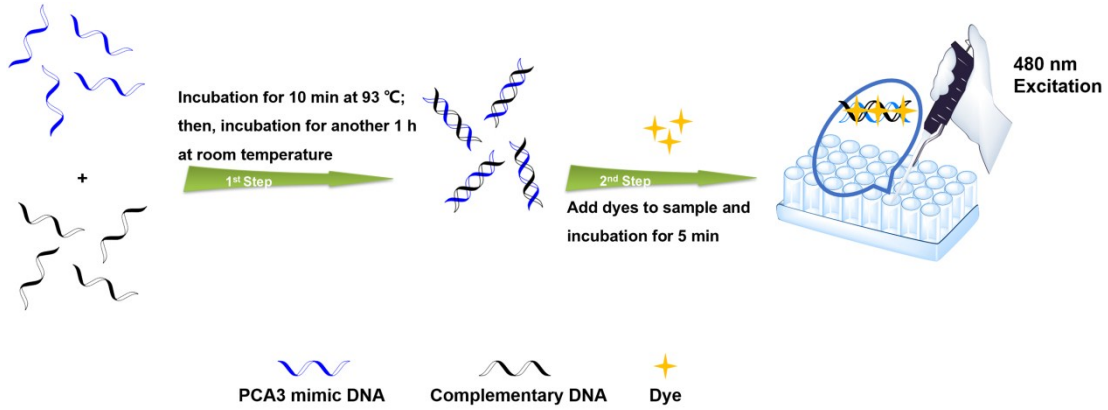

Fig. S5. Schematic illustration of the procedure of PicoGreen reagent commercial kit for quantification of PCA3 mimic DNA.

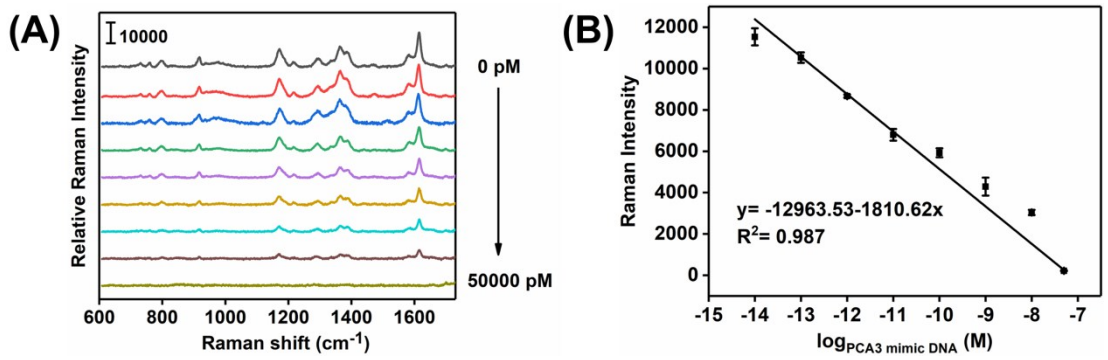

Fig. S6. (A) SERS spectra on the test line upon the addition of various concentrations of PCA3 mimic DNA in spiked human serum sample (from 0 to 50000 pM). (B) Corresponding plot of Raman intensity on test lines values versus different concentrations of PCA3 mimic DNA and the error bars indicate the standard deviations calculated from five parallel measurements. Assay time: 15 min.

Experiment Section

Procedure of PCR assay for detection of PCA3 mimic DNA

PCR assay were carried out on Mastercycler® pro S PCR instrument (Eppendorf, Germany). The information for the PCR primers was as follows: forward primer 5'-CTGTGATGACATGAGGCAGC-3' and reverse primer 5'-GCCATCAAGATTTTCTCGTC-3'. PCR was performed in a 25μL reaction mixture containing 12.5 μL of 2 × Kodaq PCR MixsterMix, 1 μL of PCA3 mimic DNA template, 1 μL of 20 μM forward primer, 1 μL of 20 μM reverse primer and 9.5 μL of sterile water. The amplification experiment was carried out according to the reported work with slightly modification.[1] And the PCR products were analyzed using agarose gel electrophoresis.

Procedure of the commercial kit

1st step: mix the PCA3 mimic DNA and the complementary DNA (concentration ratio = 1:1.2), and incubate at 93℃ for 10 min, during this time both of them were denatured and melted into straight

single stranded DNA. And then, the mixture was incubated for another 1 h at room temperature for hybridization.

2nd step: add the same volume of dyes with TE buffer into the above sample, and incubate for another 5 min at room temperature. After that the fluorescence signals were detected.

References

1 J. Yu, J. Jeon, N. Choi, J. O. Lee, Y. P. Kim and J. Choo, *Sens. Actuator B Chem.*, 2017, **251**, 302–309.