Electronic Supplementary Information

A highly sensitive fluorescence biosensor for the detection of cytochrome c based on polydopamine nanotubes and exonuclease I amplification

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Materials and instruments

The DNA strand and cytochrome c used in the experimental were purchased from Shanghai Sangon Biological Engineering Technology & Services Co., Ltd. The DNA sequence is the aptamer of Cyt c: 5′- FAM-CCG TGT CTG GGG CCG ACC GGC GCA TTG GGT ACG TTG TTGC-3′. Exonuclease I was purchased from New England Biolabs. Tryptophan (Try), Tyrosine (Tyr), Arginine (Arg), Alanine (Ala), Leucine (Leu), Serine (Ser) were all purchased from Shanghai Aladdin Biochemical Technology Co., Ltd. $CuSO_4$, $FeSO_4$, $ZnSO_4$, $MgSO_4$ were purchased from J&K Scientific Ltd. Ultrapure water were obtained from a Millipore system (an electric resistance>18.2M Ω cm).

The infrared spectrum was recorded from 4000 to 500 cm^{-1} on a NEXUS-470 Fourier transform infrared (FT-IR) spectrophotometer (Nicolet, USA). Transmission electron microscopy images (TEM) were captured by TECNAIG^2F20-S-TWIN (FEI, USA) instrument with a 200 kV accelerating voltage. Fluorescence measurements were carried out on F-7100 spectrophotometer (Hitachi, Japan) and the emission spectra were recorded from 500 nm to 650 nm at room temperature with a 488 nm excitation wavelength.

Samples determination of Cyt c in human blood samples

Fresh human blood samples were collected in tubes containing EDTA, and centrifuged at 10,000 rpm for 10 min. Acetonitrile was introduced into human blood samples with the fixed volume ratio1:1 (acetonitrile/serum). After vigorously shaking for 15 min, the mixture solution was centrifuged at 10,000 rpm for 10 min. For the detection of Cyt c in human blood samples, the samples were diluted 2 times with 20 mM Tris-HCl buffer (5 mM Mg^{2+}, 100 mM Na^+, pH 7.4). The detection procedure was the same as those described in the aforementioned experiment for Cyt c detection in buffer. The serum from volunteers was collected by the First Affiliated Hospital of Zhengzhou University, and informed consent was obtained for the use of human serum. All experiments were performed in compliance with the relevant laws and

institutional guidelines and approved by Life-Science Ethics Review Committee of Zhengzhou University.

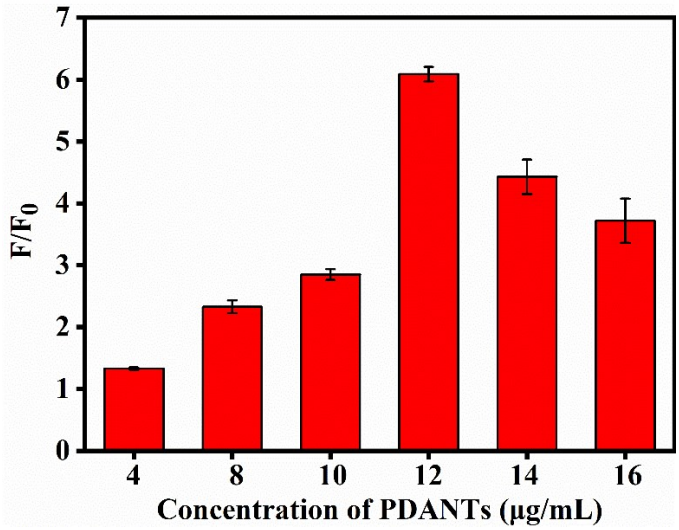

Fig. S1. Optimization of the concentration of PDANTs.

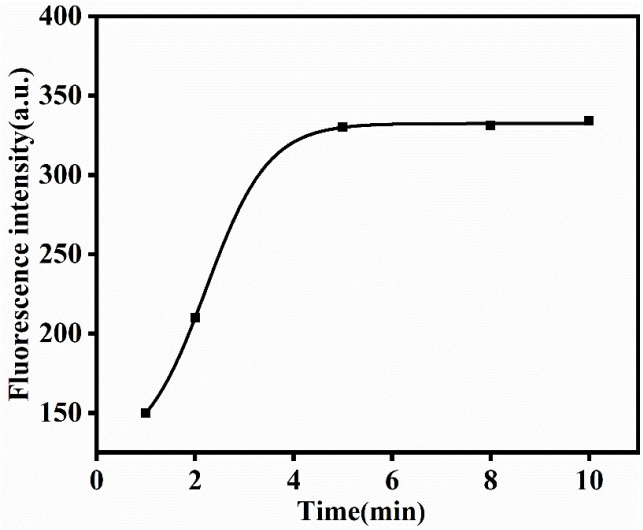

Fig. S2. Optimization of bind time between P1 and Cyt c.

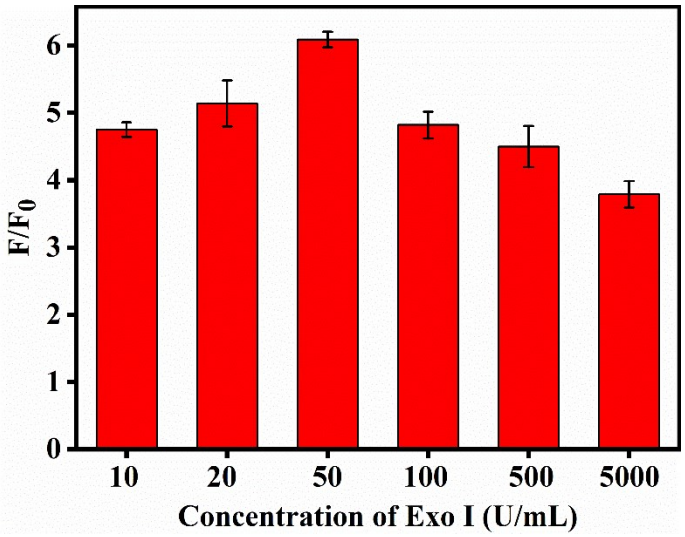

Fig. S3. Optimization of the concentration of Exo I.

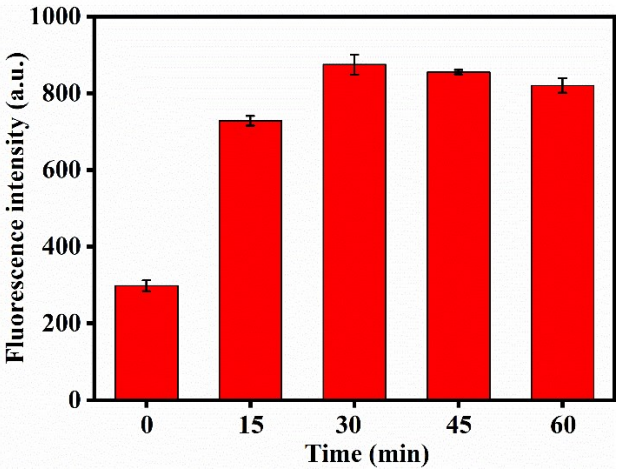

Fig. S4. Optimization of the reaction time with the addition of Exo I.

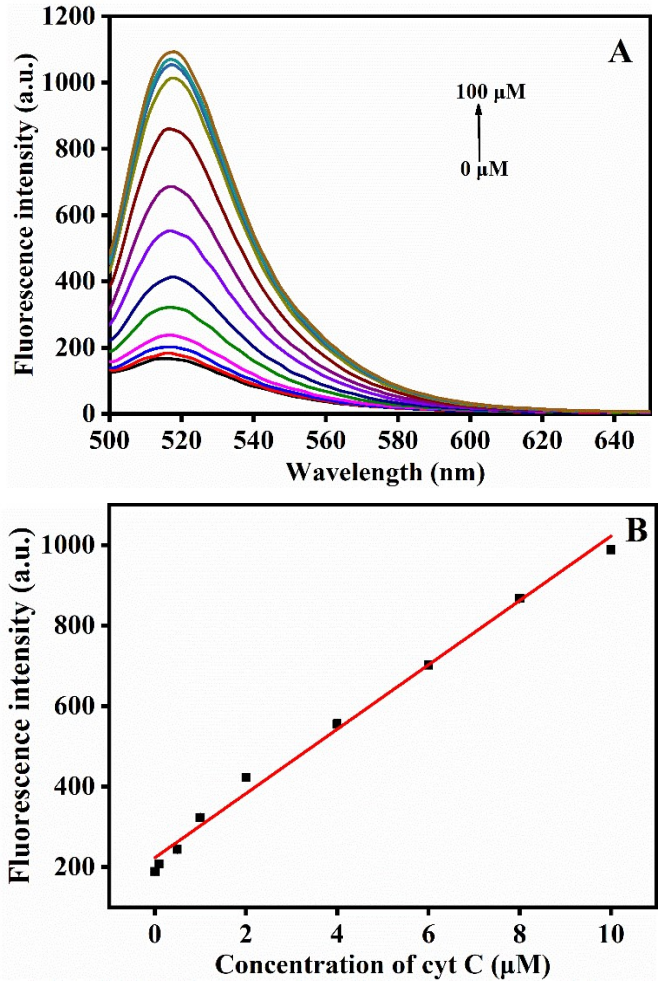

Fig. S5 (A) The fluorescence intensity with different concentration of Cty c (bottom to top, 0, 0.01, 0.05, 0.5, 1, 2, 4, 6, 8, 10, 40, 80, 100 μM) in reaction buffer containing 1% (v/v) cell extracts. (B) The linear relationship between fluorescence intensity and concentration of Cyt c in reaction buffer containing 1% (v/v) cell extracts.