Electronic Supplementary Information

Fluorescence-enhanced nucleic acid detection: Using coordination polymer colloids as a sensing platform

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Experimental Section

All chemically synthesized oligonucleotides were purchased from Shanghai Sangon Biotechnology Co. Ltd. (Shanghai, China). DNA concentration was estimated by measuring the absorbance at 260 nm. All the other chemicals were purchased from Aladin Ltd. (Shanghai, China) and used as received without further purification. The water used throughout all experiments was purified through a Millipore system.

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minor modifications: In a typical experiment, 30 μL of 0.15 M *p*-phenylenediamine (PPD) aqueous solution was introduced into 4 mL of water first, and then 200 μL of 0.019 M H_2PtCl_6 aqueous solution was added into the resulting solution with vigorous agitation at room temperature. A gradual color change was observed, and a large amount of precipitate occurred within several hours. The precipitate thus formed was collected by centrifugation, washed several times with absolute ethanol and water, and then re-dispersed in 6 mL of water for characterization and further use. The volume of each sample for fluorescence measurement is 400 μL in 20 mM Tris-HCl buffer containing 100 mM NaCl, 5 mM KCl, and 15 mM $MgCl_2$ (pH: 7.4).

Scanning electron microscopy (SEM) measurements were made on a XL30 ESEM FEG scanning electron microscope at an accelerating voltage of 20 kV. Fluorescent emission spectra were recorded on a RF-5301PC spectrofluorometer (Shimadzu, Japan). Zeta potential measurements were performed on a Nano-ZS Zetasizer ZEN3600 instrument (Malvern Instruments Ltd., U.K.).

Oligonucleotide sequences are listed below (mismatch underlined):

P_{HIV} (FAM dye-labeled ssDNA):

5’-FAM-AGT CAG TGT GGA AAA TCT CTA GC-3’

T_1 (complementary target):

5’-GCT AGA GAT TTT CCA CAC TGA CT-3’

T_2 (single-base mismatched target):

5’-GCT AGA GAT T<u>G</u>T CCA CAC TGA CT-3’

T_3 (two-base mismatched target):

5’-GCT AGA GAT TGT ACA CAC TGA CT-3’

T_4 (non-complementary target):

5’-TTT TTT TTT TTT TTT TTT TTT TT-3’

P_{HBV} (ROX dye-labeled ssDNA):

5’-ROX-TAC CAC ATC ATC CAT ATA ACT GA-3’

T_5 (Complementary target to P_{HBV}):

5’-TCA GTT ATA TGG ATG ATG TGG TA-3’

P_{K167} (Cy5 dye-labeled ssDNA):

5’-Cy5-TCT GCA CAC CTC TTG ACA CTC CG-3’

T_6 (Complementary target to P_{K167}):

5’-CGG AGT GTC AAG AGG TGT GCA GA-3’

Reference

1 X. Sun, S. Dong and E. Wang, *J. Am. Chem. Soc.*, 2005, **127**, 13102.

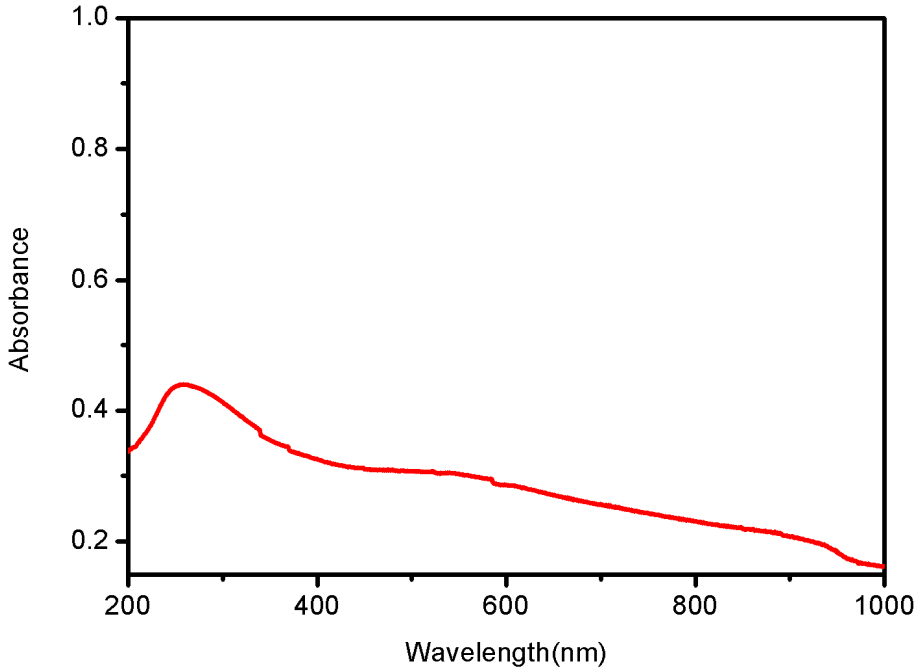

Fig. S1 Absoprtion spectrum of the aqueous dispersion of the CPCs.

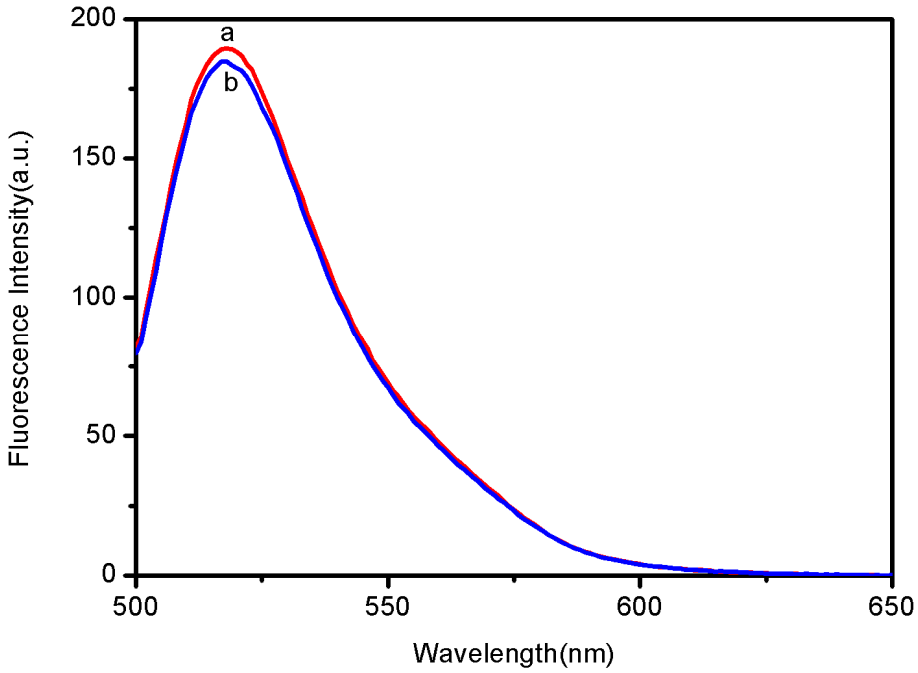

Fig. S2 Fluorescence spectra of (a) P_{HIV}-CPC complex + T_1 and (b) the supernatant of (a) after removing CPCs by centrifugation. ([P_{HIV}]=50 nM; [T_1]=300 nM; λ_{ex}=480 nm). All measurements were done in Tris-HCl buffer in the presence of 15 mM Mg^{2+} (pH: 7.4).

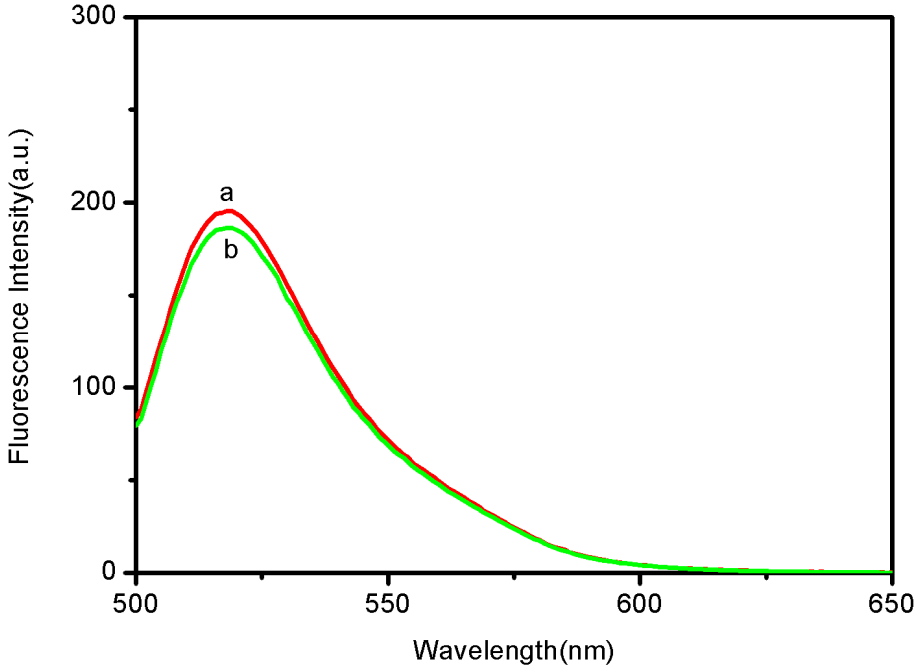

Fig. S3 Fluorescence spectra of (a) P_{HIV} + T_1 and (b) P_{HIV} + T_1 + CPCs. ([P_{HIV}]=50 nM; [T_1]=300 nM; λ_{ex}=480 nm). All measurements were done in Tris-HCl buffer in the presence of 15 mM Mg^{2+} (pH: 7.4).

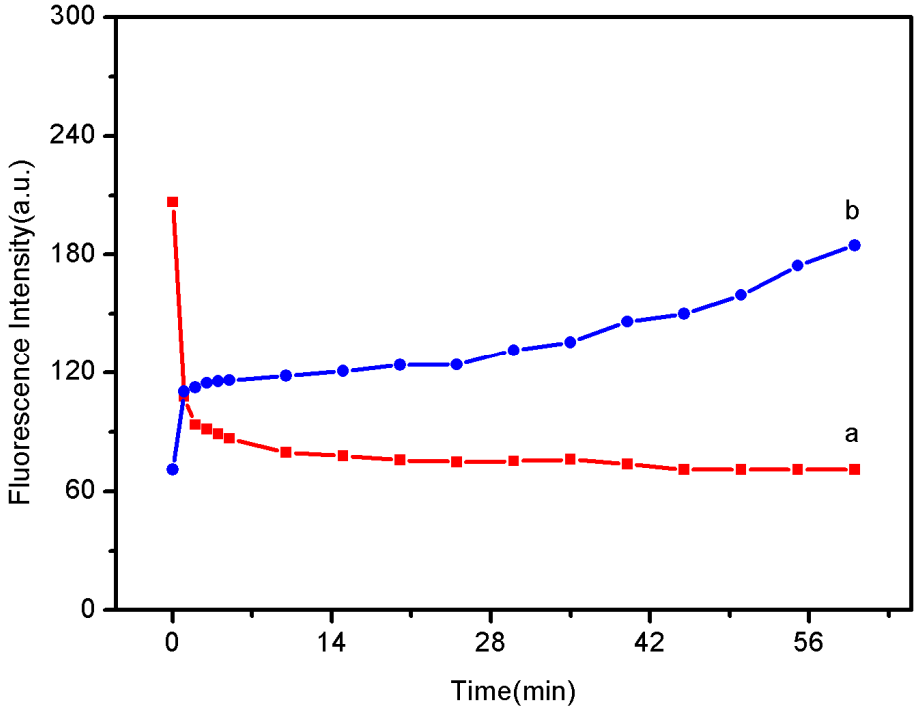

Fig. S4 (a) Fluorescence quenching of P_{HIV} (50 nM) by CNPs and (b) fluorescence recovery of P_{HIV}-CPC complex by T_1 (300 nM) in Tris-HCl buffer as a function of time. Excitation was at 480 nm, and the emission was monitored at 520 nm. All measurements were done in Tris-HCl buffer in the presence of 15.0 mM Mg^{2+} (pH 7.4).

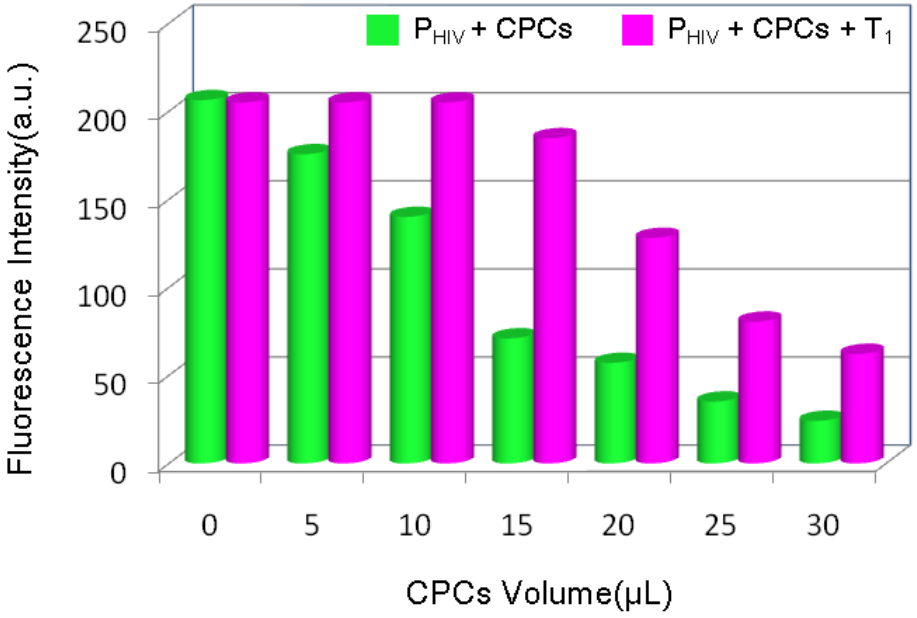

Fig. S5 Fluorescence intensity histograms of P_{HIV} + CPCs and P_{HIV} + CPCs + T_1 with the using of 0, 5, 10, 15, 20, 25, 30 μL of CPCs in this system ([P_{HIV}]=50 nM; [T_1]=300 nM). Excitation was at 480 nm, and the emission was monitored at 520 nm. All measurements were done in Tris-HCl buffer in the presence of 15 mM Mg^{2+} (pH: 7.4).