Electronic Supplementary Information

A novel application of porphyrin nanoparticles as an effective fluorescent assay platform for nucleic acid detection

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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. 2,3,7,8,12,13,17,18-octaethyl-21H, 23H-porphine iron(III) chloride (FeP) was purchased from Sigma-Aldrich Co. N,N-dimethylformamide (DMF) was purchased from Beijing Chemical Reagent Corp., China. The water used throughout all experiments was purified through a Millipore system.

FeP nanoparticles (FePNPs) were prepared as follows: In brief, 4.0 mg of FeP was dissolved in 8 mL of DMF to give a brown stock soltuion of FeP. 4 mL of the FeP stock solution was added into 4 mL of water dropwise under vigorous stirring. After 10 min, the product was collected by centrifugation and washed with water three times. The final precipitate was redispersed in 2 mL of water for further characrization and use.

For characterization by scanning electron microscopy (SEM), 2 μL of the suspension was placed on an indium tin oxide (ITO) glass slide and air-dried at room temperature. SEM measurements were made on a XL30 ESEM FEG scanning electron microscope at an accelerating voltage of 20 kV. Transmission electron microscopy (TEM) measurements were made on a HITACHI H-8100 EM (Hitachi, Tokyo, Japan) with an accelerating voltage of 100 kV. The sample for TEM measurements was prepared by placing a dilution of the colloidal solution on a

carbon-coated copper grid and drying at room temperature. Fluorescent emission spectra were recorded on a RF-5301PC spectrofluorometer (Shimadzu, Japan). Zeta potential measurements were performed on a Nano-ZS Zetasizer ZEN3600 (Malvern Instruments Ltd., U.K.). An energy-dispersive X-ray spectroscopic detecting unit was used to collect the energy-dispersed spectrum (EDS) for elemental analysis.

The volume of each sample for fluorescence measurement is 300 μL in 20 mM Tris-HCl buffer containing 100 mM NaCl, 5 mM KCl, and 5 mM $MgCl_2$ (pH: 7.4). All the experiments were carried out at room temperature (about 25 ºC) if not specified.

Oligonucleotide sequences are listed as follows:

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

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

(2) T_1 (complementary target):

5’-GCT AGA GAT TTT CCA CAC TGA CT-3’

(3) T_2 (single-base mismatched target):

5’-GCT AGA GAT TGT CCA CAC TGA CT-3’ (mismatch underlined).

(4) T_3 (non-complementary target):

5’-TTT TTT TTT TTT TTT TTT TTT TT-3’

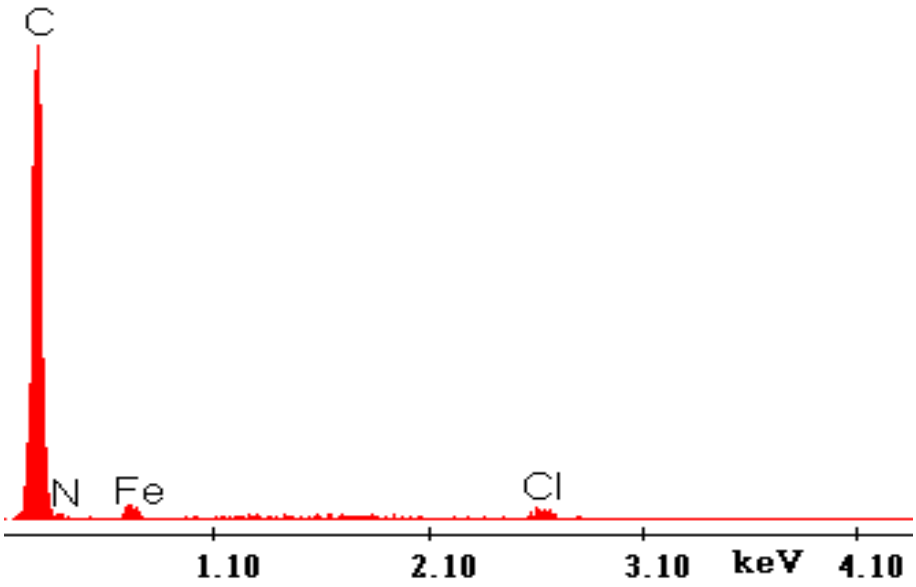

Fig. S1 EDS data of the FePNPs thus formed.