Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information For

Synthesis and characterization of a bifunctional nanoprobe for CGG trinucleotide repeat detection

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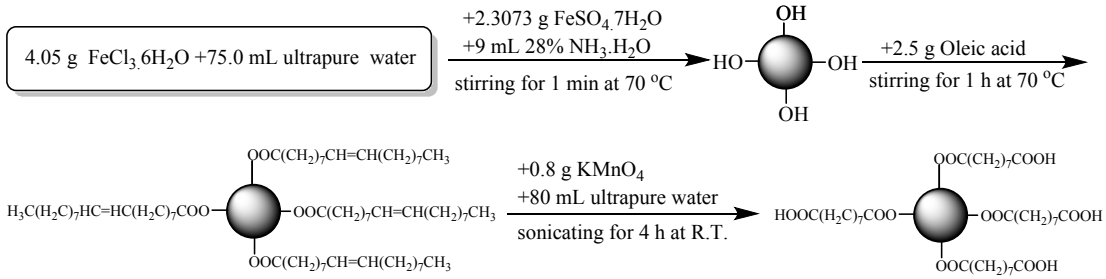
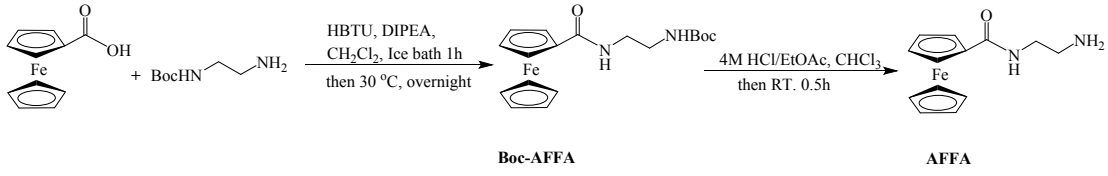
Table S1 The sequence information of DNA used in the present work

Name	Sequence (5' end to 3' end)
SH-DNA	HS-$(CH_2)_6$-GGCCACGAGTTGACA
d$(CGG)_{10}$	CGGCGGCGGCGGCGGCGGCGGCGGCGGCGGTGTCAACTCGTGGCC
d$(TGG)_{10}$	TGGTGGTGGTGGTGGTGGTGGTGGTGGTGTCAACTCGTGGCC
d$(CCG)_{10}$	CCGCCGCCGCCGCCGCCGCCGCCGCCGTGTCAACTCGTGGCC
d$(GAA)_{10}$	GAAGAAGAAGAAGAAGAAGAAGAAGAATGTCAACTCGTGGCC
d$(CAG)_{10}$	CAGCAGCAGCAGCAGCAGCAGCAGCAGTGTCAACTCGTGGCC
d$(CTG)_{10}$	CTGCTGCTGCTGCTGCTGCTGCTGCTGTGTCAACTCGTGGCC
d$(ATT)_{10}$	ATTATTATTATTATTATTATTATTATTTGTCAACTCGTGGCC



Scheme S1 Preparation process of carboxyl functionalized Fe_3O_4 MNPs



Scheme S2 Synthesis of N-(2-aminoethyl) ferrocenyl formamide (AFFA)

Synthesis of N-(2-(N-(tert-butoxycarbonyl)) aminoethyl) ferrocenyl formamide (Boc-AFFA)

Ferrocenecarboxylic acid (345 mg, 1.5 mmol), HBTU (1.1377 g, 3.0 mmol) and DIPEA (1.0451 mL, 6.0 mmol) were dissolved in 30 mL CH_2Cl_2 and the solution was stirred for 1 h in ice bath. Then N-(tert-butoxycarbonyl)-ethylenediamine (315.4 μL, 2.0 mmol) was added into the mixture and the mixture was stirred overnight at 30°C. The filtrate was concentrated followed by

washing with Na_2CO_3 and H_2O, and drying over Na_2SO_4. The crude product was further purified by silica gel column chromatography using CH_2Cl_2/CH_3OH (v/v=50:1) as the eluent to give 253 mg saffron yellow solid with a 45% yield. R_f =0.6, $CHCl_3/CH_3OH$ (v/v=8:1). ^1H NMR ($CDCl_3$, 600 MHz) δ: 1.46(s, 9H), 3.37(t, 2H), 3.49(t, 2H), 4.20(s, 5H), 4.34(s, 2H), 4.69(s, 2H), and 6.61(s, 1H). LC-MS: Calculated for $C_{18}H_{24}FeN_2O_3$ $[(M+H)^+]$ 373.25, found 373.11.

Synthesis of N-(2-aminoethyl) ferrocenyl formamide (AFFA)

Dissolve (1) (9.3 mg, 0.025 mmol) in 4 mL $CHCl_3$ and 4 M HCl/EtOAc (2.0 mL) was added dropwise into the solution under stirring in ice bath. The mixture was stirred for 0.5 h at room temperature. The mixture was evaporated in vacuo to get the residue. The residue was washed successively with $CHCl_3$ followed by evaporating in a vacuum on a rotary evaporator to get AFFA that would be used in the next modification of CMNPs. LC-MS: Calculated for $C_{13}H_{16}FeN_2O$ $[(M+H)^+]$ 273.13, found 273.06.

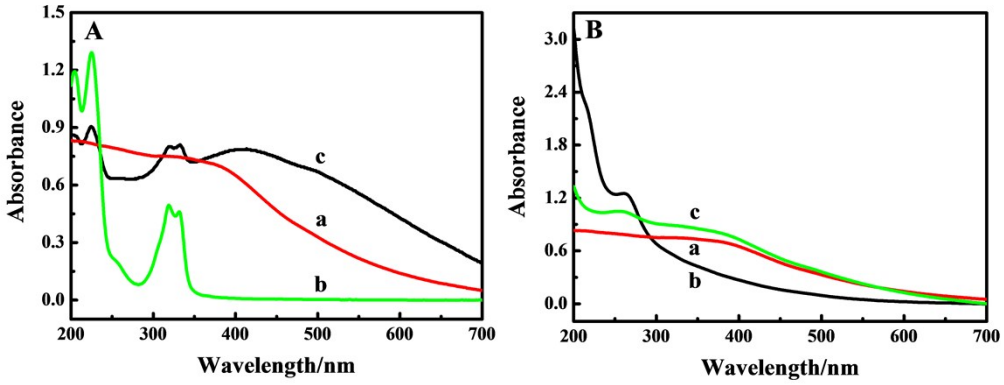


Figure S1 (A) UV-vis spectra of CMNPs (a), NC-linker (b) and NC-linker modified CMNPs (c); (B) UV-vis spectra of CMNPs (a), AFFA (b) and AFFA modified CMNPs (c).