Supporting Information

Fluorinated DNA Micelles: Synthesis and Properties

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Experimental section

Materials. 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11 Heptadecafluorodecyl iodide and 2-cyanoethyl-N, N-diisopropylchlorophosphoramidite were purchased from Sigma. N,N-Diisopropylethylamine (DIPEA), 4-aminophenol, Dimethylformamide (DMF), Ethyl acetate (EtOAc), hexanes, Na_2SO_4, $NaHCO_3$, doxorubicin (DOX) and other chemical regents were obtained from commercial suppliers. 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium (MTS) was purchased from Promega. Ultrapure Milli-Q water (Millipore) was used throughout the experiments.

Synthesis of compound 1. 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11 Heptadecafluorodecyl iodide (1 g, 1.7 mmol), DIPEA (0.22 g, 1.7 mmol) and 4-aminophenol (0.083 g, 0.77 mmol) were mixed in anhydrous DMF solution (5 mL) under nitrogen gas protection and stirred in reflux at 120 °C overnight. Upon cooling to room temperature, the reaction mixture was poured into 50 mL of water and then extracted 3 times with 100 mL EtOAc. The collected organic compound was dried over anhydrous Na_2SO_4 and concentrated under low pressure. After purification by flash chromatographic column (hexanes to 20/80 EtOAc/hexanes), compound 1 of ~0.5g was obtained and identified by ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.87 (s, 1H), 6.85 (d, 2H), 6.76 (d, 2H), 3.28 (t, 4H), 2.33 (m, 4H), 1.80 (m, 4H) and ^{19}F NMR (300 MHz, $CDCl_3$) δ -82.30 (t, 6F), -115.17 (s, 4F), -122.65-123.2 (m, 12F), -123.91 (s, 4F), -124.74 (s, 4F), -127.42(s, 4F).

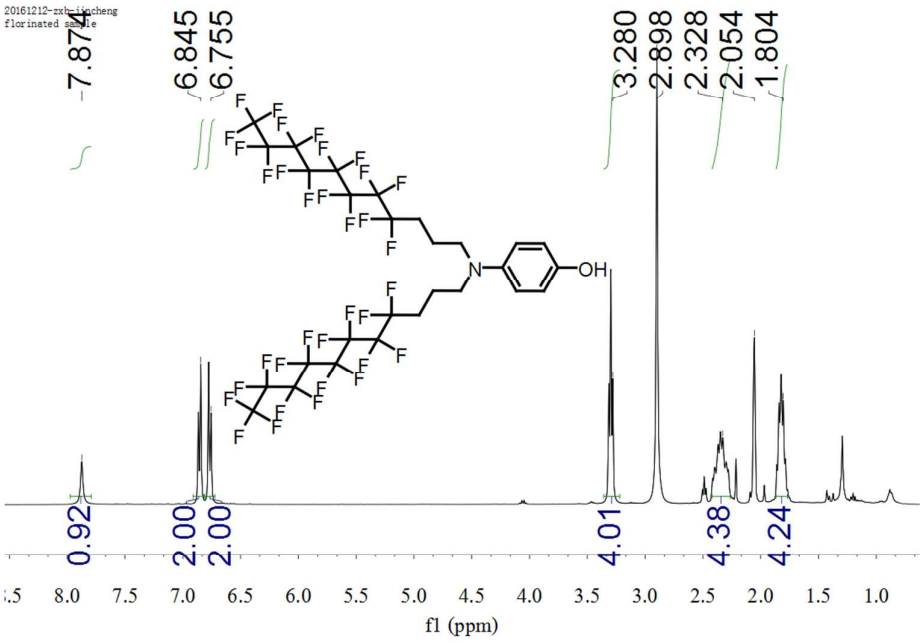

Figure S1. ^{1}H NMR spectrum of compound 1.

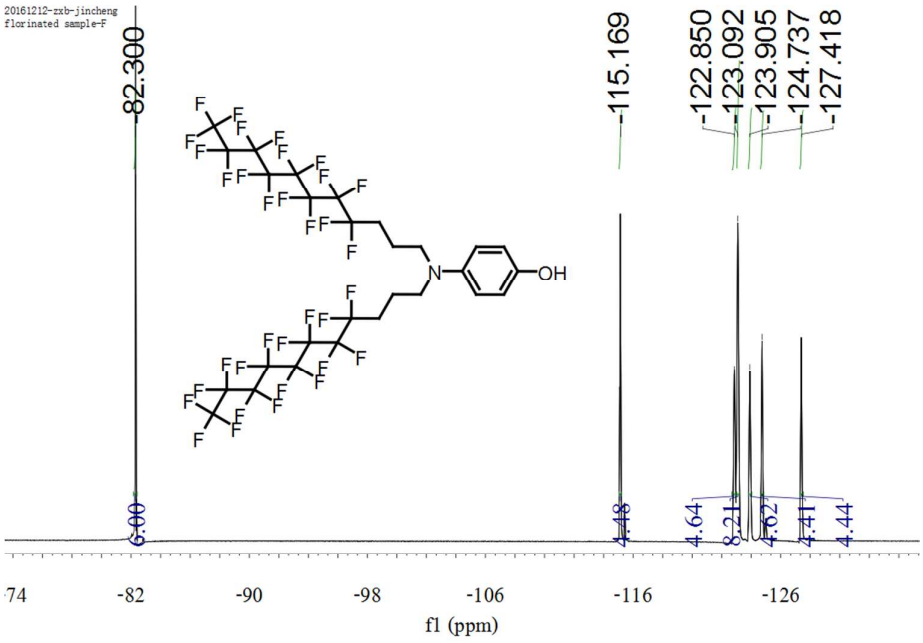

Figure S2. ^{19}F NMR spectrum of compound 1.

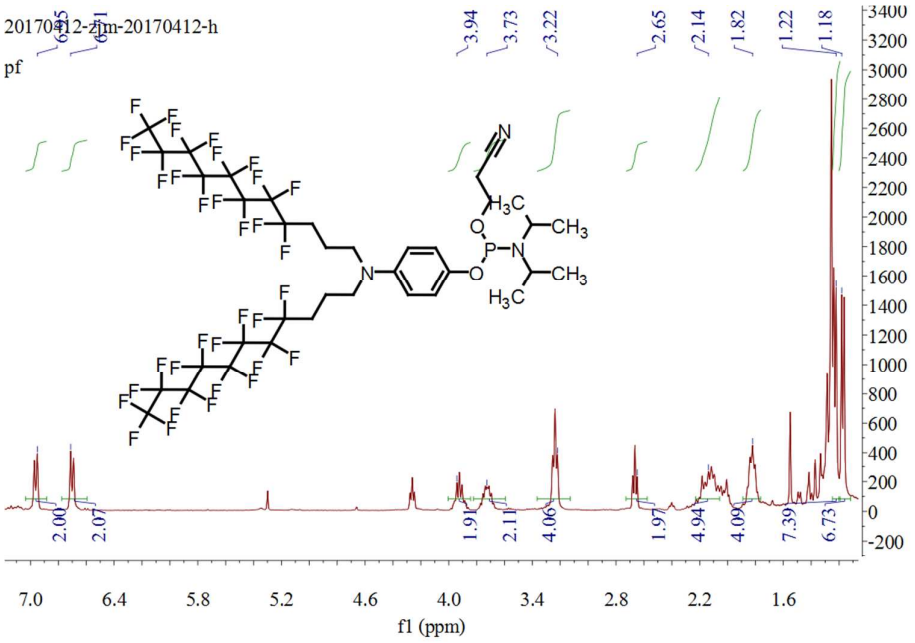

Figure S3. ^{1}H NMR spectrum of compound 2.

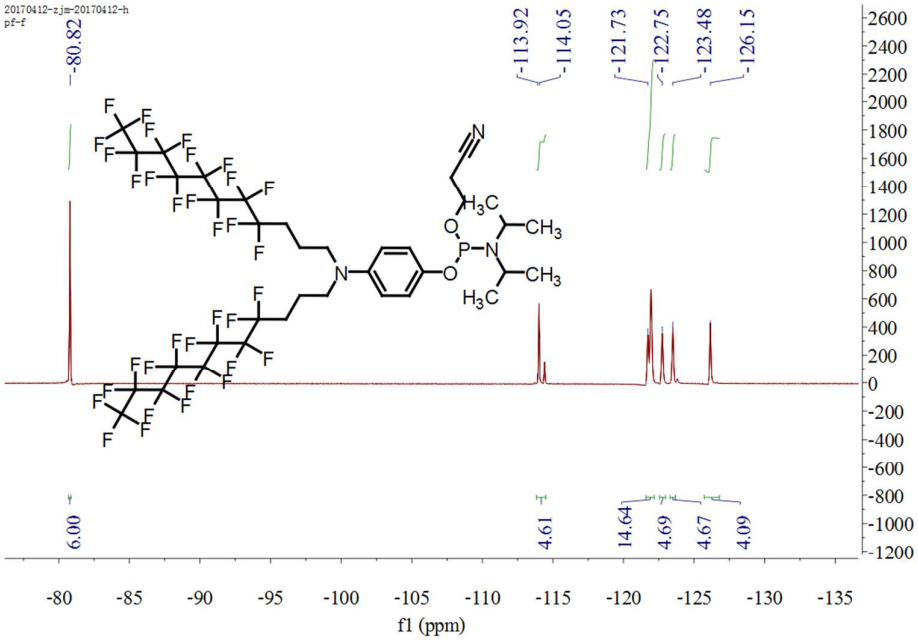

Figure S4. ^{19}F NMR spectrum of compound 2.

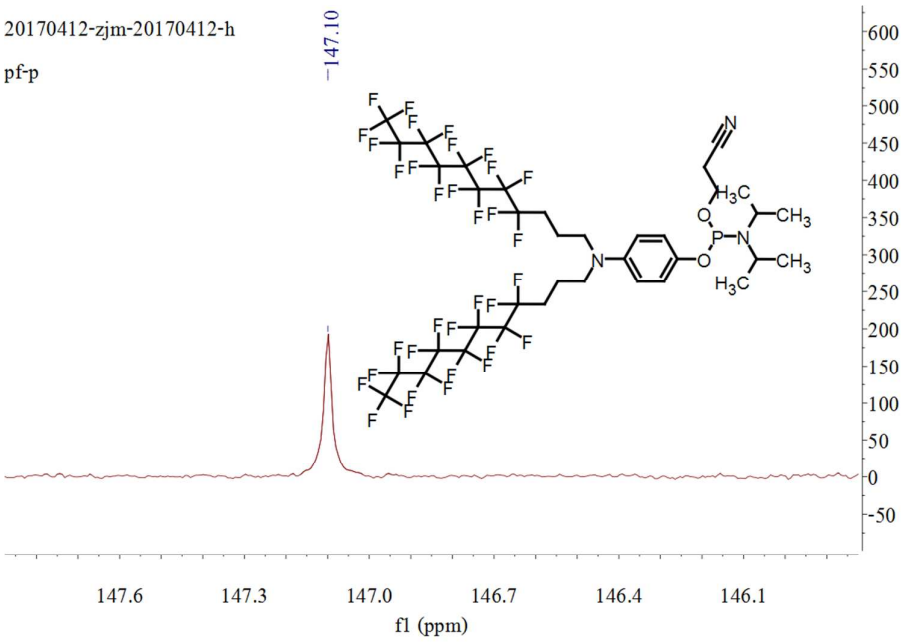

Figure S5. ^{31}P NMR spectrum of compound 2.

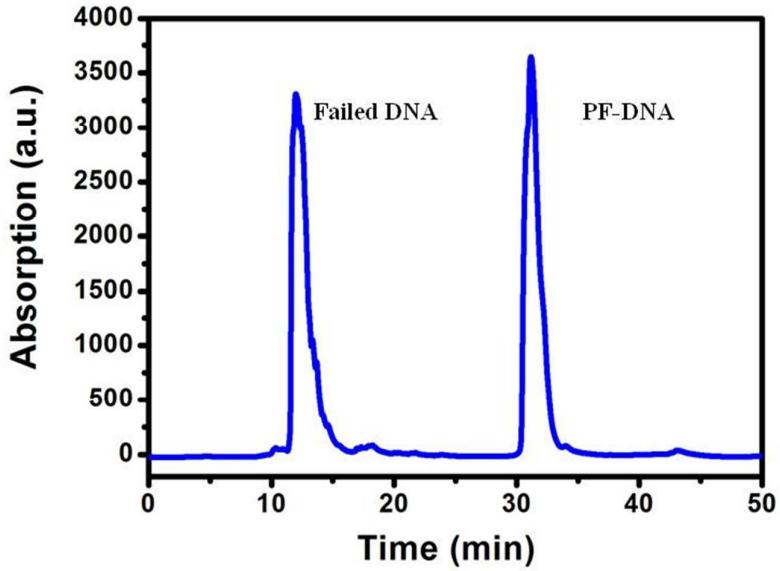

Figure S6. High-performance liquid chromatography (HPLC) profile of PF-T_{15}-TAMRA. The retention time of ~32 min represents PF-T_{15}-TAMRA, and the retention time of ~12 min represents unconjugated DNA fragments.

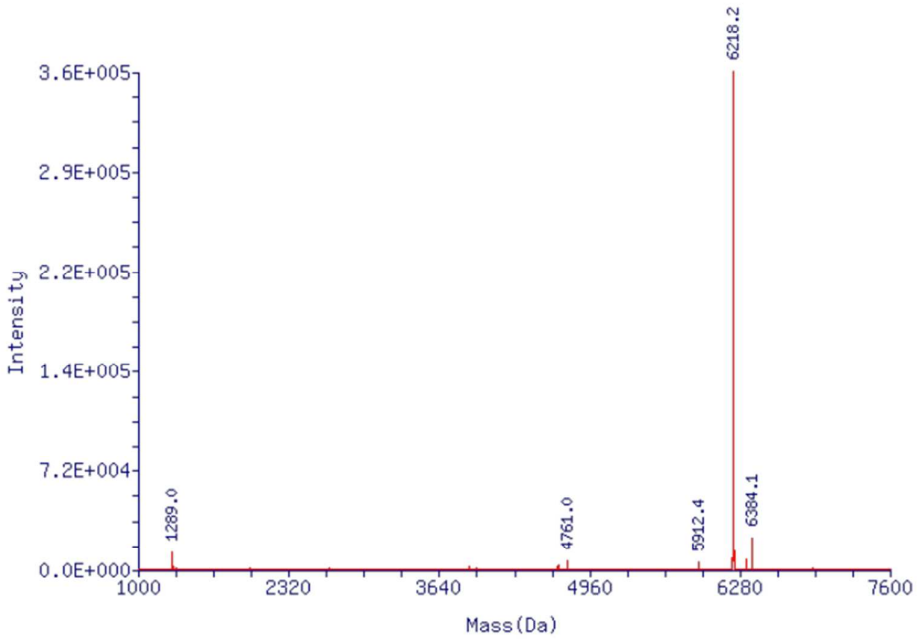

Figure S7. ESI-MS analysis of the diperfluorodecyl-DNA conjugates (PF-DNA) with the sequence of PF-TTT TTT TTT TTT TTT-TAMRA. The calculated molecular weight of the PF-DNA and the DNA fragment was 6215.9 g/moL and 6218.2 g/moL, respectively.

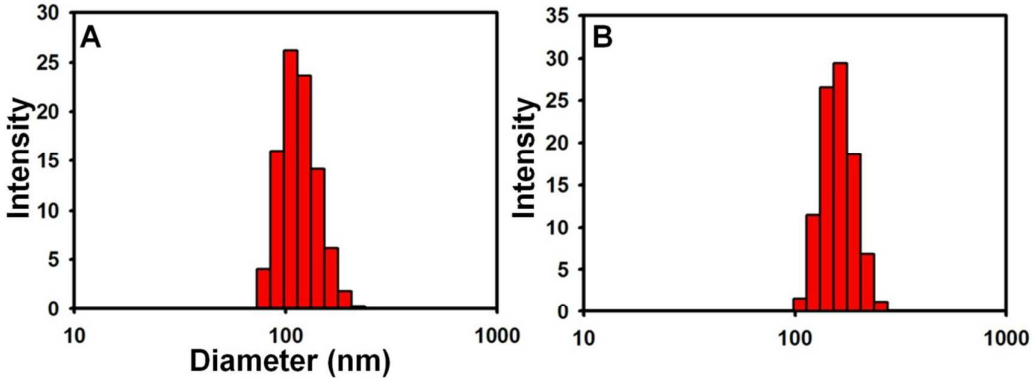

Figure S8. Dynamic light scattering (DLS) data of 2 μM PF-T_{30} (A) and 2 μM PF-T_{45} (B) in DPBS plus 5 mM Mg^{2+}.

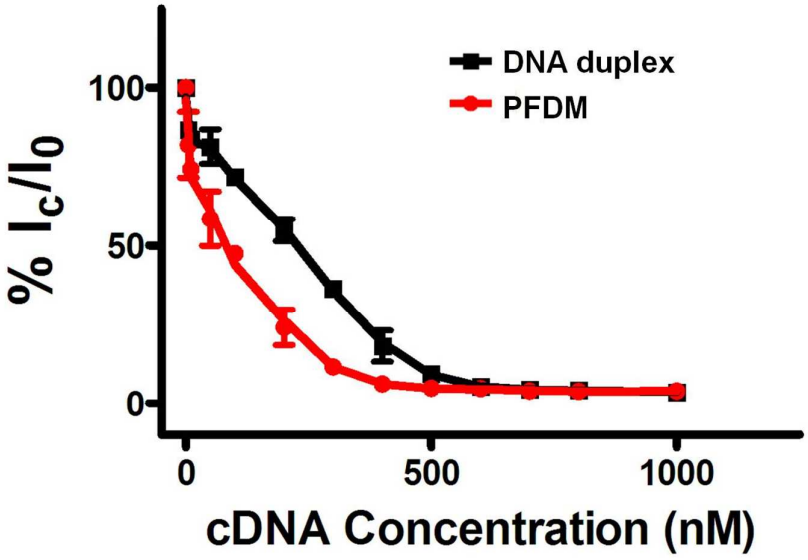

Figure S9. Comparison of target binding affinity between PF-DNA micelles (PFDM) and free DNA. Fluorescence intensity of FAM-labelled PFDM and FAM-labelled DNA with addition of Dabcyl-labelled cDNA at different concentrations.

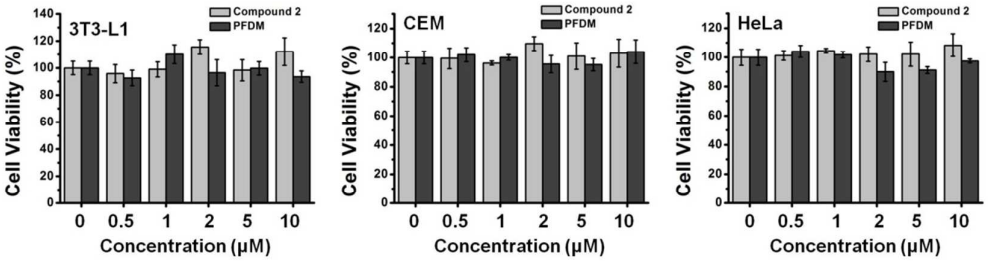

Figure S10. Cytotoxicity of compound 2 and PF-DNA conjugate. Cells (3T3-L1, CEM and HeLa) were incubated with compound 2 or PF-DNA conjugate of different concentrations at 37 ^{o}C for 48 h, and the cell viability was tested with a MTS assay.

Table S1. DNA sequences designed in this work.

Name	Sequences (from 5' to 3')
PF-py-T_{15}	PF-py-TTT TTT TTT TTT TTT
PF-py-T_{30}	PF-py-TTT TTT TTT TTT TTT TTT TTT TTT TTT TTT
PF-py-T_{45}	PF-py-TTT TTT TTT TTT TTT TTT TTT TTT TTT TTT TTT TTT TTT
py-T_{15}	py-TTT TTT TTT TTT TTT
PF-DNA-FAM	PF-TTT CCC AGC CCT C-FAM
DNA-FAM	CCC AGC CCT C-FAM
cDNA-Dabcyl	Dabcyl-GAG GGC TGG G
PF-T_{15}	PF- TTT TTT TTT TTT TTT
T_{15}	TTT TTT TTT TTT TTT
PF-T_{15}-TAMRA	PF- TTT TTT TTT TTT TTT-TAMRA
T_{15}-TAMRA	TTT TTT TTT TTT TTT-TAMRA
cDNA-BHQ	BHQ-AAA AAA AAA AAA AAA

Notes: PF indicates diperfluorodecyl chain modification; py indicates pyrene molecule.

Table S2. HPLC purification of lipid-conjugated oligonucleotides according to this elution program.

Time/min	A (0.1M TEAA)	B (acetonitrile)
0	**95%**	**5%**
4	**95%**	**5%**
4.01	**90%**	**10%**
40	**10%**	**90%**
50	**10%**	**90%**