Supporting Information

Novel autonomous protein-encoded aptamer nanomachines and isothermal exponential amplification for ultrasensitive fluorescence polarization sensing of small molecules

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Table S1 Oligonucleotide sequences used in this work.

Table S2 Analysis of different analytes by aptasensors.

Figure S1. The effect of CEA concentration on the relative FP value for detection of 40 pM AFB1 by using the amplified nanomachine-based FP sensing method. Error bars were derived from N=5 experiments.

Figure S2. The dependence of the relative FP value on the reaction time for detection of 4 μM AFB1 by using the amplified nanomachine-based FP sensing method. Error bars were derived from N=5 experiments.

Figure S3. The derived calibration curve corresponding to the increase of the relative P value of the protein-encoded aptamer nanomachine sensing system for AFB1 detection. The correlation equation was $\Delta P = 45.838\log C + 161.14$ ($R^2 = 0.9975$), where ΔP was the relative P value (mP) and C was the AFB1 concentration (nM). Error bars were derived from N=5 experiments.

Figure S4. The derived calibration curve corresponding to the increase of the relative P value of the protein-encoded aptamer nanomachine sensing system for cocaine detection. The correlation equation was $\Delta P = 42.333\log C + 68.829$ ($R^2 = 0.9966$), where ΔP was the relative P value (mP) and C was the cocaine concentration (nM). Error bars were derived from N=5 experiments.

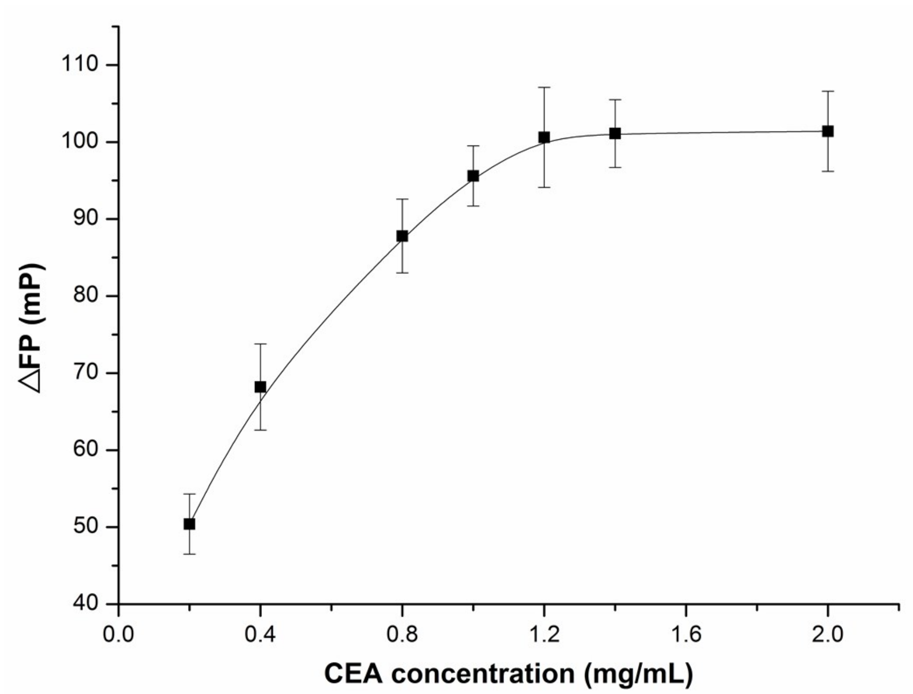
Table S1

Name	Sequences (5'→3')
H1	*GTTGGGCACGTGTTGTCTCTCTGTGTCTCGTGCCCTTCGCT* *AGGCCC*ACGTTGCCTCAGCCTTACGTGGGCCTACTGTTTTT TTATACCAGCTTATTCAATT-2
H2	*GGGAGACAAGGATAAATCCTTCAATGAAGTGGGTCTCCC*TA GCTGCCTCAGCCTTGCTAGGGAGACCTGTTTTTTTATACCAG CTTATTCAATT
Primer-1	FAM-CAGTAGG
Primer-2	FAM-CAGTAGGC
Primer-3	FAM-CAGTAGGCC
Primer-4	FAM-CAGTAGGCCC
Primer-5	FAM-CAGTAGGCCCA
Primer-6	FAM-CAGGTCTC

Table S2

Method	Detection limit	Ref.
AFB1		
Fluorescent aptasensors	35 ng/L (0.11 nM)	1
	0.1 ng/mL (0.3 nM)	2
Electrochemical aptasensor	0.05 nM	3
Chemiluminescence aptasensor	0.11 ng/mL (0.35 nM)	4
Amplified PCR-based fluorescent aptasensor	25 fg/mL (0.1 pM)	5
Autonomous protein-encoded aptamer nanomachine	0.24 pM	This work
Cocaine		
Fluorescent aptasensors	200 nM	6
	0.1 μM	7
	190 nM	8
	10 nM	9
Colorimetric aptasensors	2 μM	10
	50 nM	11
Amplified eletrochemical aptasensors	105 pM	12
	0.21 nM	13
	33 nM	14
Silica nanoparticle-enhanced fluorescent aptasensor	209 pM	15
Autonomous aptamer machines	5 μM	16
	1 μM	17
Fluorescent aptasensor based on rolling circle amplification	0.48 nM	18
SERS aptasensor based on proximity-dependent isothermal cycle amplification	0.1 nM	19
Fluorescent aptasensor based on strand amplification	2 nM	20
Exonuclease III amplified fluorescent aptasensor	50 nM	21
Endonuclease amplified fluorescent aptasensors	7 pM	22
Autonomous protein-encoded aptamer nanomachine	18 pM	This work

Figure S1



110
100
90
80
70
60
50
40
△FP (mP)
0.0
0.4
0.8
1.2
1.6
2.0
CEA concentration (mg/mL)

Figure S2

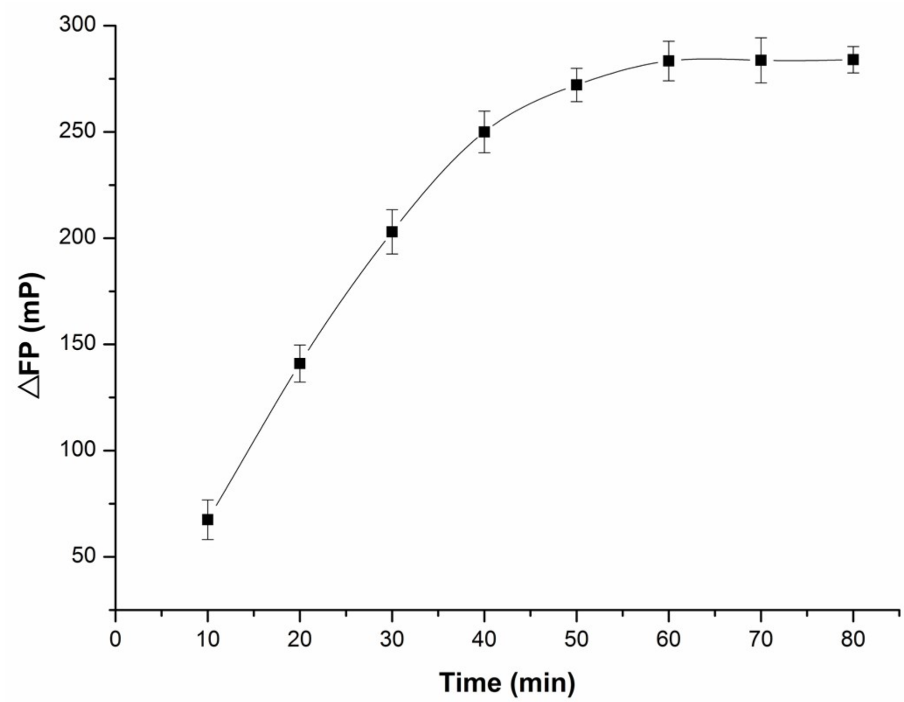


Figure S3

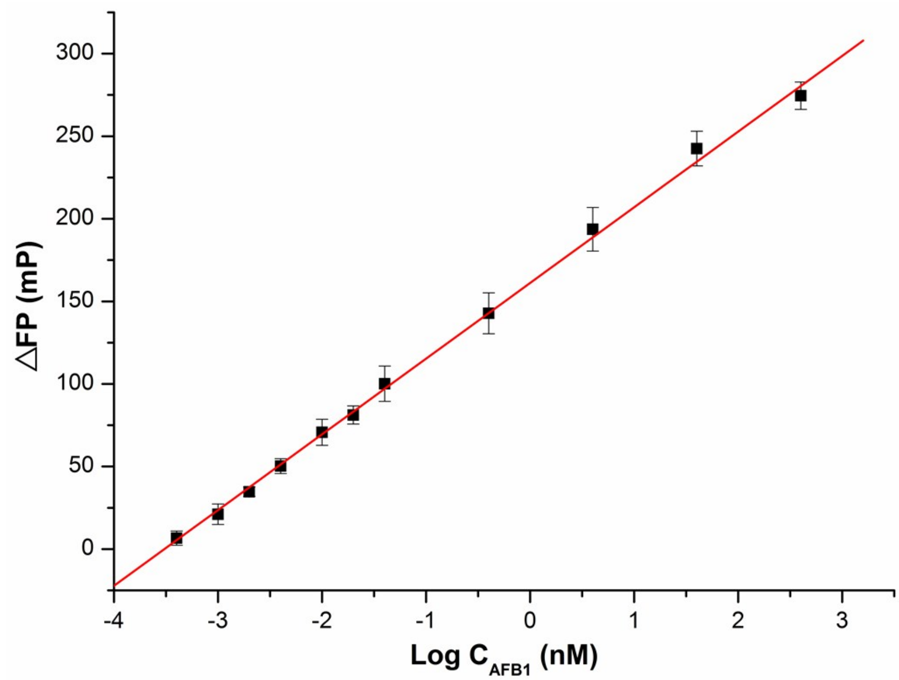
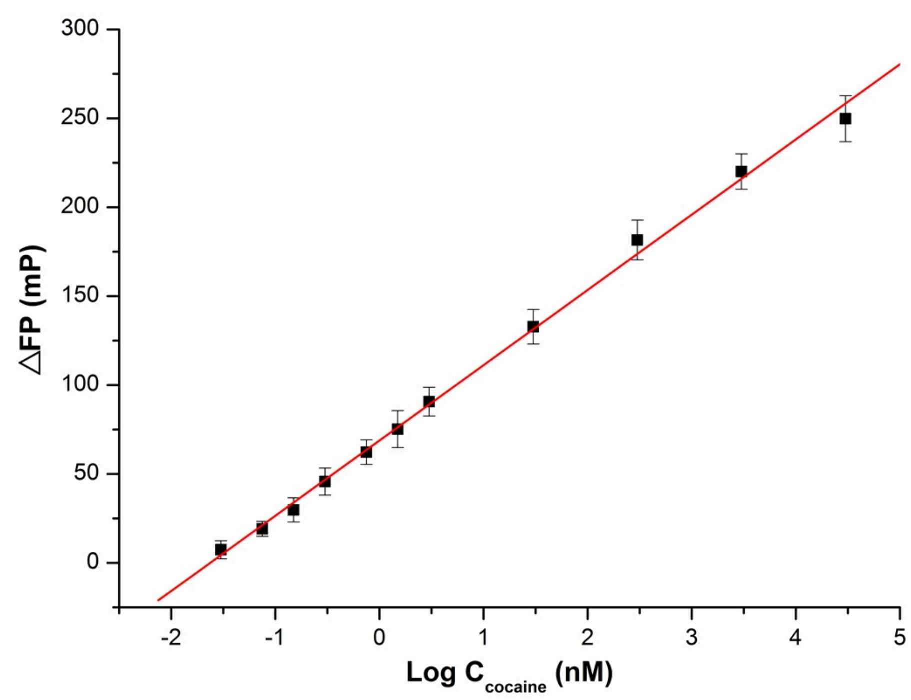


Figure S4



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