Supplementary Material

Rapid Fluorescent Detection of Immunoglobulin E Using an Aptamer Switch Based on Binding-Induced Pyrene Excimer

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Table S1 Comparison of a few aptamer-based optical methods for detection of IgE

Method	Detection limit	Reference
Molecular light switch luminescence assay using $[Ru(phen)^{2-}(dppz)]^{2+}$	0.1 nM	22
Fluorescence anisotropy assay	0.35 nM	23
Biochip based fluorescence assay using dye-labeled IgE	0.05 nM	24
Signaling aptamers using fluorescent nucleotide analogues	tens nM	25
Competitive molecular beacon based assay	0.057 nM	26
Competitive fluorescence quenching assay	0.17 nM	27
Aptamer switch based on binding-induced pyrene excimer	1.6 nM	This work

Table S2 Comparison of assays using aptamer excimer probe for different targets

Target molecules	Detection limit	Reference
Potassium ion	NA[a]	37
Potassium ion	400 μM	41
Cocaine	1 μM	38
ATP	0.5 μM	39
Lysozyme	0.2 nM	39
Thrombin	0.1 nM	42
Thrombin	0.042 nM	43
PDGF-BB	Picomolar range	36
IgE	1.6 nM	This work

[a] NA means not available

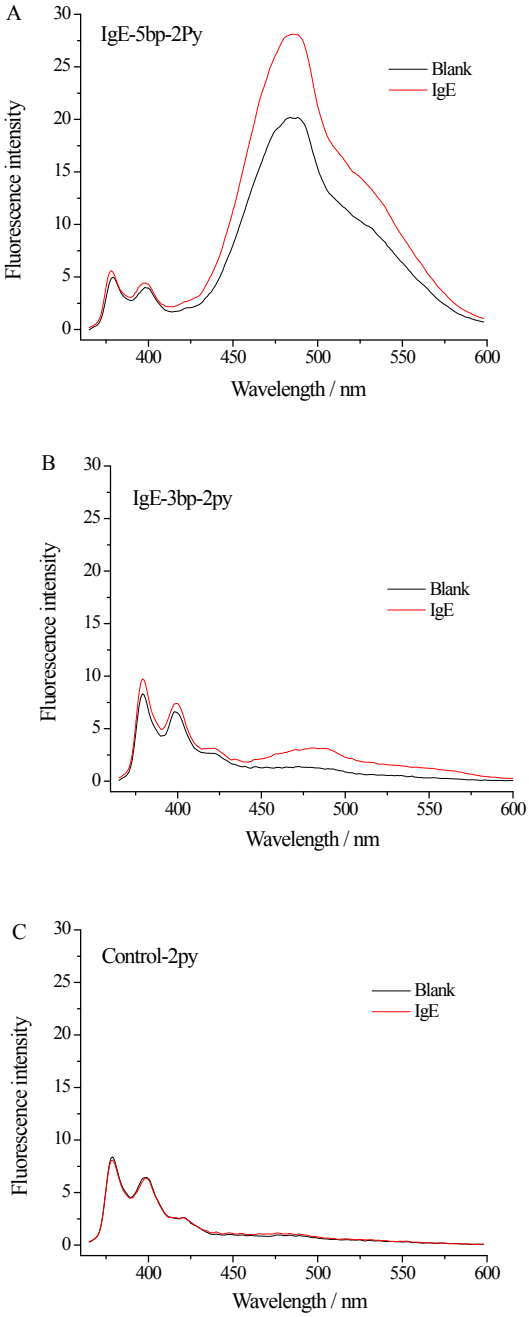

Fig. S1 Emission spectra of the 50 nM different aptamer probes of IgE-5bp-2Py (A), IgE-3bp-2py (B), and Control-2py (C) in the absence of IgE (black line) and in the presence of 50 nM IgE (red line). The sample buffer (20 mM Tris-HCl, pH 7.5) containing 150 mM NaCl, 5 mM KCl and 1 mM $MgCl_2$ was used.

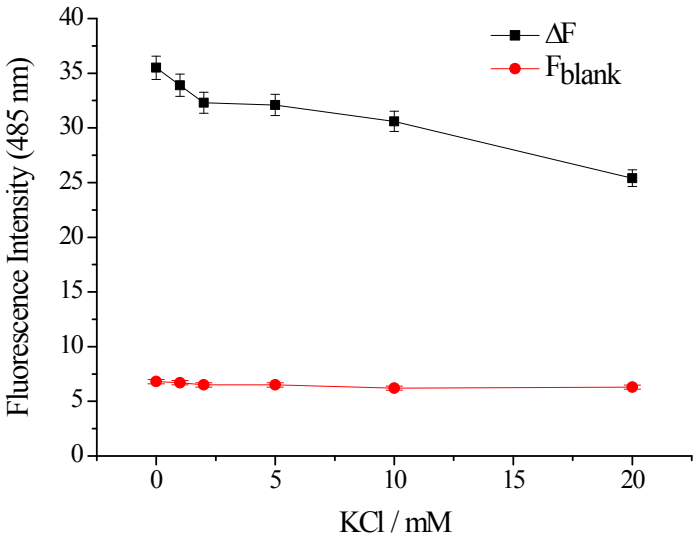

Fig. S2 The effect of KCl on fluorescence signal of blank sample (F_{blank}) and IgE-induced signal change (ΔF, obtained by subtracting F_{blank} from fluorescence signal of sample containing 50 nM IgE) in the buffer (20 mM Tris-HCl, pH 7.5) containing 50 mM NaCl and 1 mM $MgCl_2$ and IgE-4bp-2Py (50 nM).

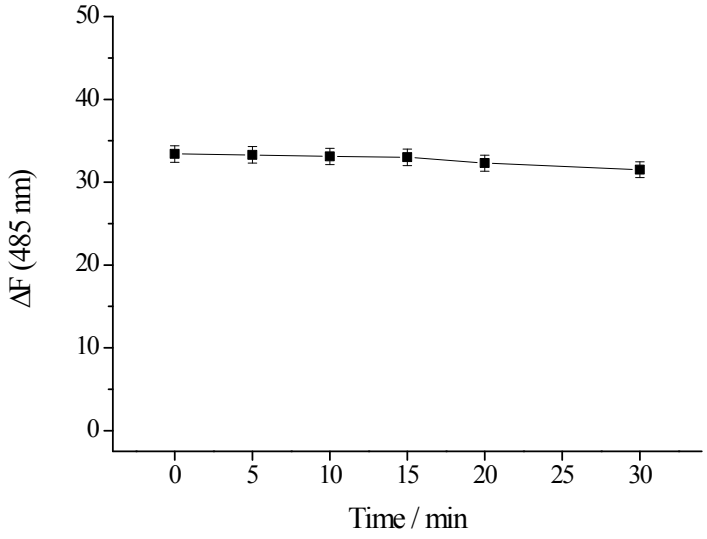

Fig. S3. The effect of incubation time on IgE-induced signal change (ΔF, obtained by subtracting fluorescence signal of blank sample from fluorescence signal of sample containing 50 nM IgE) in the buffer (20 mM Tris-HCl, pH 7.5) containing 50 mM NaCl and 1 mM $MgCl_2$ and IgE-4bp-2Py (50 nM).

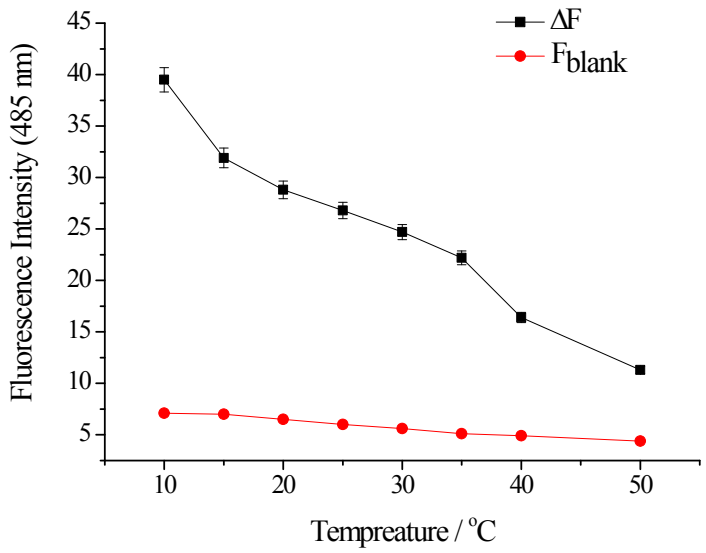

Fig. S4 The effect of the temperature on the response of the aptamer probe IgE-4bp-2Py (50 nM) to IgE (50 nM) in the buffer (20 mM Tris-HCl, pH 7.5) containing 50 mM NaCl and 1 mM $MgCl_2$.

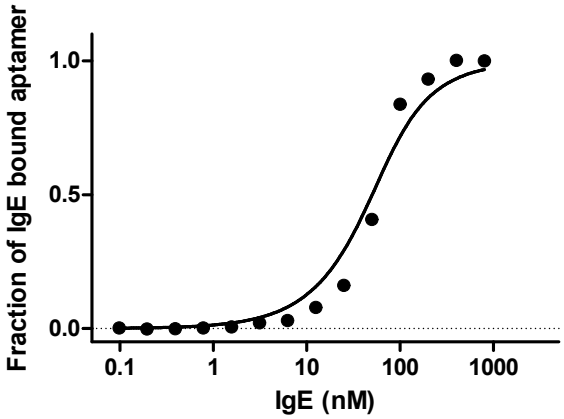

Fig. S5 The plot of the fraction of bound aptamer versus the concentration of IgE obtained by using nonlinear least-square regression analysis for the determination of dissociation constant (K_d).

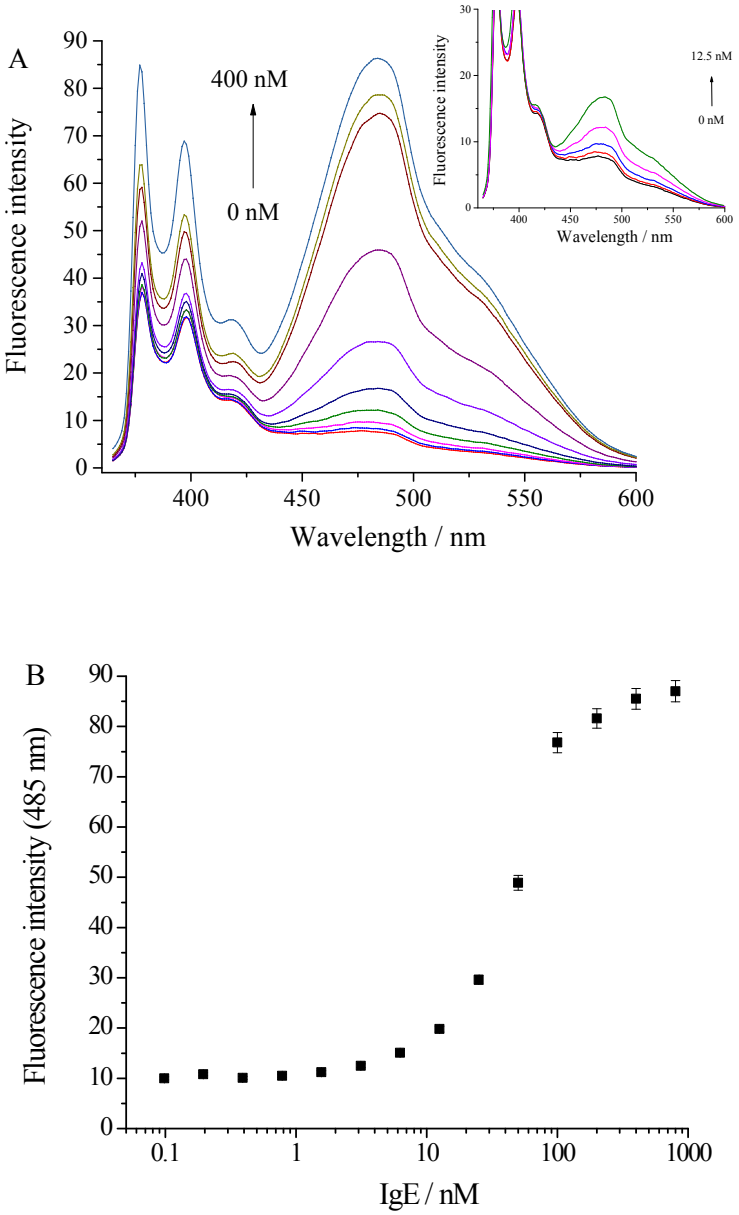

Fig. S6 Detection of IgE with aptamer probe IgE-4bp-2Py in 500-fold diluted human serum. (A) Emission spectra of IgE-4bp-2Py with typical increasing concentrations of IgE (curves from bottom to top corresponding to 0, 1.6, 3.2, 6.3, 12.5, 25, 50, 100, 200 and 400 nM IgE). (B) The relationship between fluorescence intensity at 485 nm and the concentrations of IgE.