A single-bead telomere sensor based on fluorescence resonance energy transfer

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Supplementary information:

Table S1 Dependability (Rs) of the single bead sensor which calculated by fluorescence intensity.

(A) calculated by peak area of fluorescence, (B) calculated by peak height of fluorescence.

Sequence		Addition of ZnTCPP			Addition of Target DNA			RS
		IDonor	IAcceptor	ID/IA	IDonor	IAcceptor	ID/IA	
A	I	10.98	32.14	0.34	39.03	7.67	5.09	14.97±3.47
	II	11.96	31.39	0.38	39.88	6.40	6.23	16.39±1.54
	III	16.33	27.53	0.59	40.45	6.30	6.42	10.88±0.23
	VI	27.80	18.97	1.47	43.98	3.94	11.17	7.60±0.06

	V	39.91	7.55	5.29	44.38	0.73	60.96	11.52±0.22
Non-binding DNA		16.33	27.53	0.59	21.72	29.15	0.75	1.27
B	I	0.24	0.76	0.31	0.81	0.19	4.15	13.39±1.86
	II	0.25	0.75	0.34	0.84	0.16	5.18	15.24±1.63
	III	0.35	0.65	0.53	0.84	0.16	5.12	9.66±0.31
	VI	0.56	0.44	1.25	0.90	0.10	8.79	7.03±0.09
	V	0.82	0.18	4.47	0.97	0.031	30.81	6.89±0.10
Non-binding DNA		0.35	0.65	0.53	0.41	0.59	0.70	1.32

Table S2. FRET efficiencies

DNA sample	FRET efficiencies after addition of target DNA	FRET efficiencies between Crimson 625 and Alexa 488
Line 1	0.22±0.02	0.75 ±0.04
Line 2	0.15±0.04	0.76±0.01
Line 3	0.18±0.01	0.63±0.01
Line 4	0.12±0	0.46±0
Line 5	0.05±0	0.22±0

The single-bead FRET sensor was assumed to be homogeneous in solution. The concentration of microspheres was calculated by equation: $C = \frac{C_1 V_1}{V}$, where C_1, V_1 is the original concentration (2.3×10^{12}/mL) and volume of microspheres solution (20 μL), respectively, V is total volume of solution.

There are two kinds of DNA distribution in a sensor solution. One was a high density state which bounded to the bead (local DNA) and another was for those DNA molecules in free solution. Here, the concentration of local DNA on a single microsphere was calculated by

equation: $C = \frac{N / N_A}{V}$, where N is the number of carboxyl groups on the surface of the a microsphere (***Analyst, 2011, 136, 1599-1607***), N_A is avogadro's number, V is volume of a microsphere.