Supporting Information for:

A novel homolateral and dicationic AIEgen for the sensitive detection of casein

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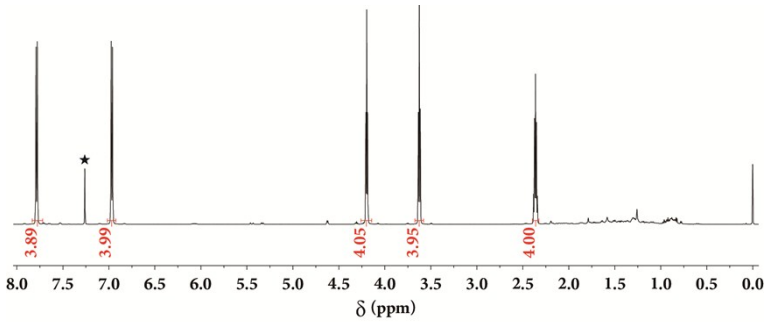

Fig. S1. ^{1}H NMR spectrum of compound **1** in $CDCl_3$ (asterisks represent solvent peaks).

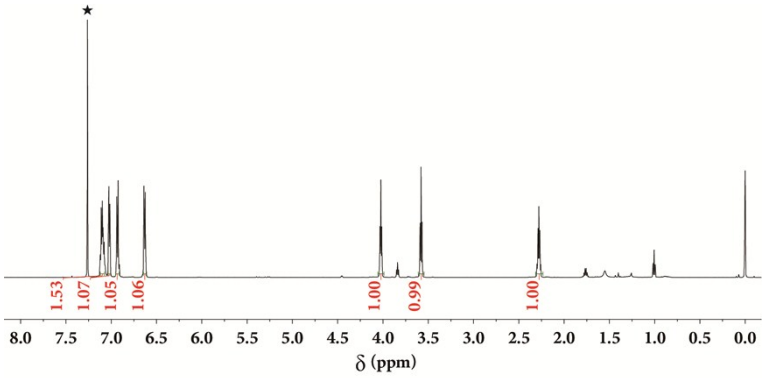

Fig. S2. ^{1}H NMR spectrum of compound **2** in $CDCl_3$ (asterisks represent solvent peaks).

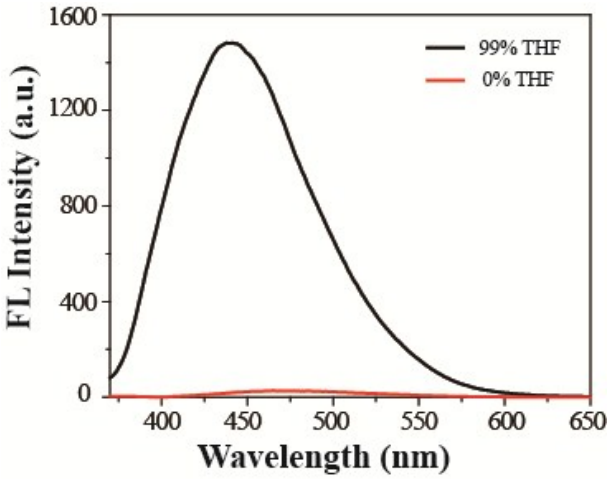

Fig. S3. Fluorescence spectra (λex = 350 nm) of 20 μM *o*-TPEDTA in water-THF mixtures.

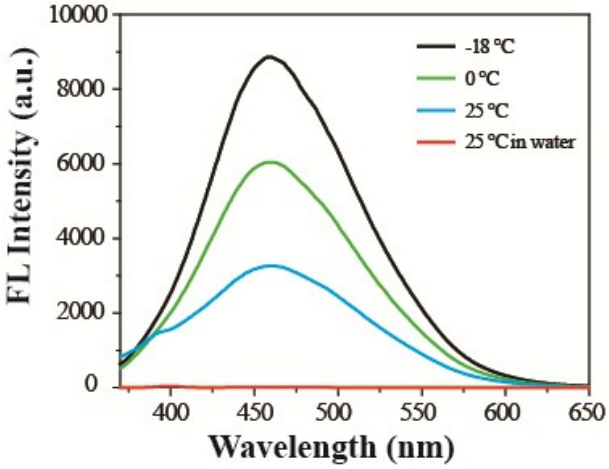

Fig. S4. Fluorescence emission spectra of 20 μM *o*-TPEDTA in glycerol-H_2O mixture (99% glycerol) at different temperatures.

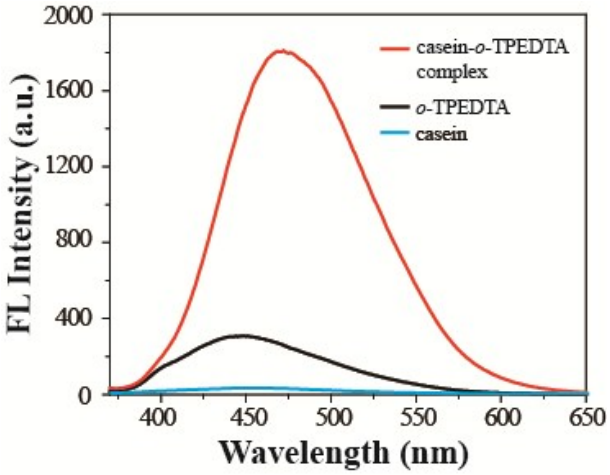

Fig. S5. Fluorescence emission spectra of 100 μg/mL casein, 20 μM *o*-TPEDTA and casein-*o*-TPEDTA complex solution.

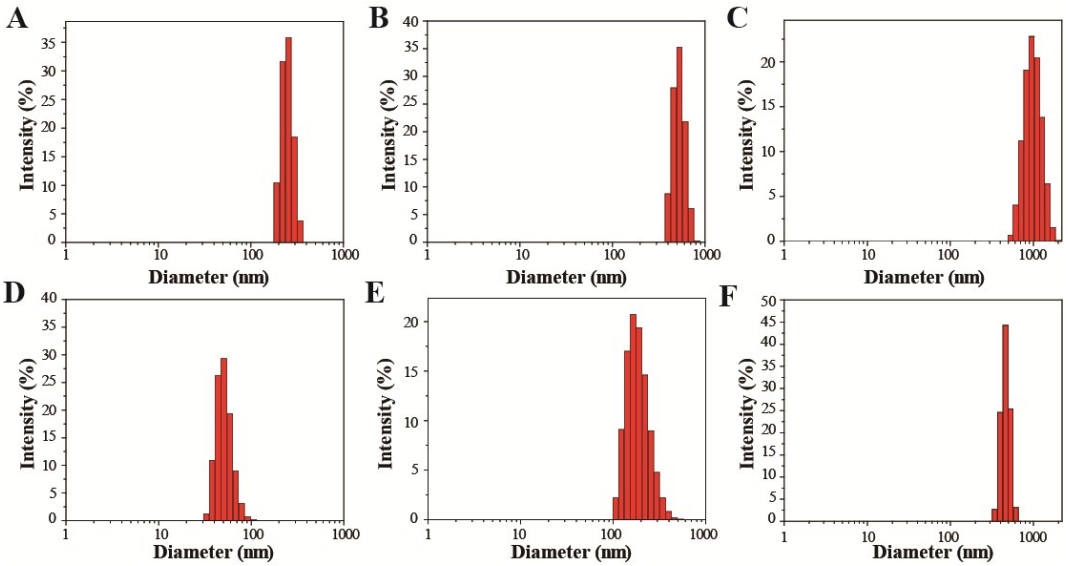

Fig. S6. Hydrodynamic size distribution of (A) 50 μM, (B) 100 μM, and (C) 200 μM *o*-TPEDTA solution and upon adding 100 μg/mL casein (E, D and F).

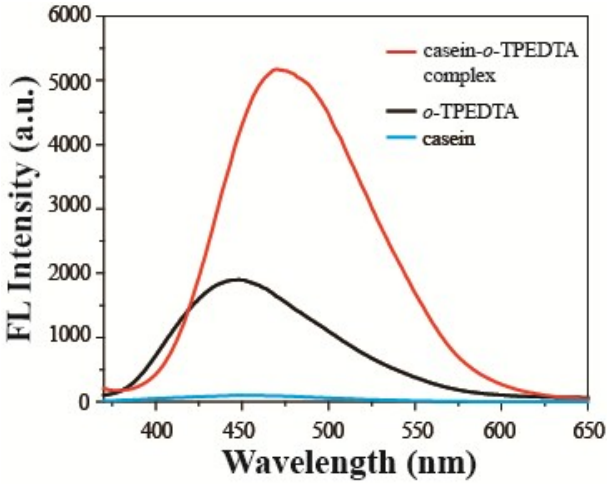

Fig. S7. Fluorescence emission spectra of 100 μg/mL casein, 100 μM *o*-TPEDTA and casein-*o*-TPEDTA complex solution.

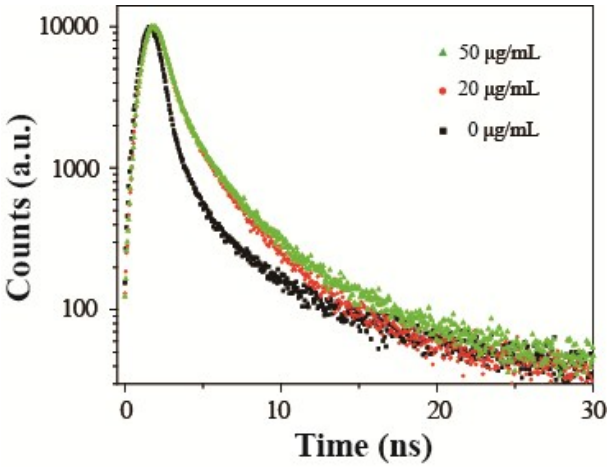

Fig. S8. The fluorescence decay curves of *o*-TPEDTA with different concentration of casein.

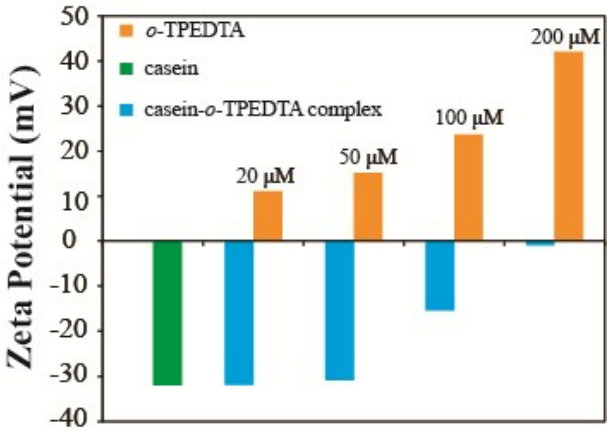

Fig. S9. Zeta potential measurements of 100 μg/mL casein without (green histogram) and with (blue histogram) the addition of different concentrations of *o*-TPEDTA, and *o*-TPEDTA only (yellow histogram).

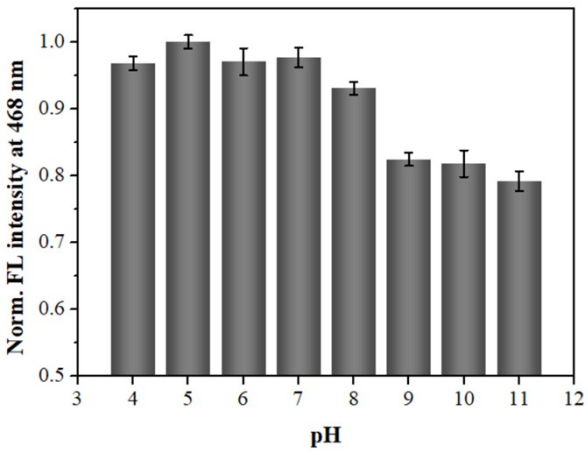

Fig. S10. Normalized fluorescent intensities of 20 μM *o*-TPEDTA solution in the presence of 100 μg/mL casein with different pH values.

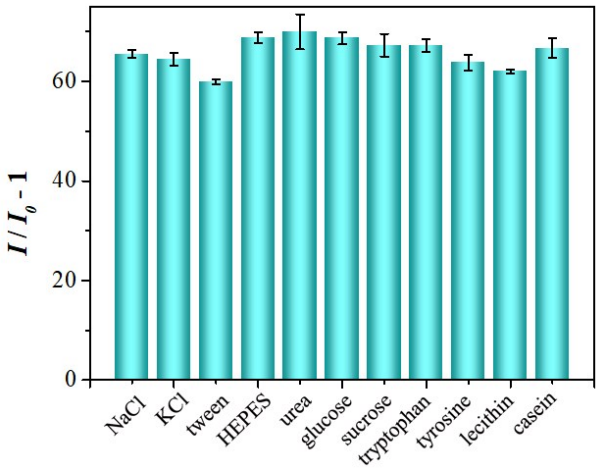

Fig. S11. Fluorescence intensity increment (I/I_0-1) of o-TPEDTA solution upon adding 60 μg/mL casein in the presence of various interferents.

Table S1. The milk powder samples information.

Remarks	Total protein (label) (g)/100 g	Casein (g)/100 g
Full milk first stage 1	2.30	1.84 ~ 2.07
Full milk third stage 2	15.30	12.24 ~ 13.77
Full milk third stage 3	17.50	14.00 ~ 15.75
Full milk for female 4	23.80	19.04 ~ 21.42

Table S2. The multiexponential decay fitting results of fluorescence lifetimes of *o*-TPEDTA upon adding casein.

Conc. (μg/mL)	τ_1 (ns)	A_1%	τ_2 (ns)	A_2%	τ_3 (ns)	A_3%	τ_{ave} (ns)
0	0.23	63.64	1.22	22.63	6.15	13.73	1.26
20	0.43	41.83	1.57	39.23	4.90	18.93	1.72
50	0.45	42.51	1.68	37.09	5.70	20.40	1.98

Table S3. Comparison of this work with some established spectroscopic casein detection methods.

No.	Probe	Strategy	LOD (μg/mL)	Linear range (μg/mL)	Ref
1	BSPOTPE	Fluorescence	10	20–1250	33
2	fluorescent microspheres	Fluorescence	0.1	0.1–10	44
3	2,2',4,4'-tetrahydroxybenzophenone azine	Fluorescence	5.7	0–300	45
4	immunomagnetic beads	Colorimetry	0.4	2–128	46
5	polyclonal antibodies raised against a casein fining agent	Colorimetry	0.2	0.49–60	47
6	anti-bovine β-casein monoclonal antibody	Colorimetry	10	10–8000	48
7	phosphomolybdic acid	SERS	1.5	2.5–25	49
8	nanoMIPs	SPR	0.13	0–150	50
9	gold nanoparticles	Colorimetry	0.03	0.08–250	51
10	*o*-TPEDTA	Fluorescence	0.05	0.1–10	This study