Supporting information

Driving Force to Detect Alzheimer's Disease Biomarkers: The Application Of A Thioflavine T@Er-MOF Ratiometric Fluorescent Sensor for Smart Detection of Presenilin 1, amyloid β-protein and Acetyl Choline

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Table S1. Crystallographic Data and Details of Refinements for **Er-MOF** [a,b]

	Er-MOF
Formula	$C_{24.82}H_{21.38}ErN_{1.27}O_{7.27}$
M (g mol^{-1})	621.0195
Crystal system	monoclinic
Space group	I_2/a
a (Å)	13.9072(6)
b (Å)	13.7531(9)
c (Å)	32.8737(12)
α (deg)	90
β (deg)	102.000(4)
γ (deg)	90
V (Å^3)	6150.2(5)
Z	8
F (000)	2490.0
ρ_{calc} (Mg m^{-3})	1.367
μ (mm^{-1})	2.769
data/restraints/parameters	5424/127/367
GOF on F^2	1.033
R_1[a] ($I = 2\sigma(I)$)	0.0524
ωR_2[b] (all data)	0.1461

[a]$R_1 = \Sigma\ ||F_0| - |F_c||/|F_0|$; [b]$\omega R_2 = [\Sigma w(|F_0|^2 - |F_c^2|^2/w|F_o^2|^2]^{1/2}$.

Table S2. Selected Bond Lengths [Å] and Angles [º] for **Er-MOF**[a].

Er-MOF					
Er(1)-O(1)	2.304(6)	Er(1)-O(1)^{1}	2.687(5)	Er(1)-O(2)^{1}	2.379(6)
Er(1)-O(3)^{2}	2.338(5)	Er(1)-O(4)^{3}	2.323(6)	Er(1)-O(5)^{4}	2.372(5)
Er(1)-O(6)^{4}	2.481(6)	O(4)-Er(1)^{6}	2.323(6)	Er(1)-O(7)	2.32(2)
Er(1)-O(8)	2.405(10)	O(5)-Er(1)^{4}	2.372(5)	O(6)-Er(1)^{4}	2.481(6)
O(1)-Er(1)^{1}	2.687(5)	O(2)-Er(1)^{1}	2.379(6)	O(3)-Er(1)^{5}	2.338(5)
O(1)-Er(1)-O(1)^{1}	75.7(2)	O(1)-Er(1)-O(2)^{1}	124.58(18)	O(1)-Er(1)-O(3)^{2}	80.76(19)
O(1)-Er(1)-O(4)^{3}	74.47(19)	O(1)-Er(1)-O(5)^{4}	133.8(2)	O(1)-Er(1)-O(6)^{4}	82.10(19)
O(1)^{1}-Er(1)-C(21)^{4}	138.0(2)	O(1)-Er(1)-C(21)^{4}	107.7(2)	O(1)-Er(1)-O(7)	84.2(4)
O(1)-Er(1)-O(8)	147.1(5)	O(1)-Er(1)-O(7')	75.9(8)	O(1)-Er(1)-O(8')	142.1(15)
O(2)^{1}-Er(1)-O(1)^{1}	50.55(17)	O(2)^{1}-Er(1)-O(6)^{4}	126.57(19)	O(3)^{2}-Er(1)-O(1)^{1}	66.95(17)
O(2)^{1}-Er(1)-O(8)	72.6(4)	O(3)^{2}-Er(1)-O(5)^{4}	141.9(2)	O(3)^{2}-Er(1)-O(6)^{4}	144.2(2)
O(3)^{2}-Er(1)-O(2)^{1}	88.9(2)	O(3)^{2}-Er(1)-O(8)	71.1(5)	O(4)^{3}-Er(1)-O(2)^{1}	74.4(2)
O(4)^{3}-Er(1)-O(3)^{2}	133.40(18)	O(4)^{3}-Er(1)-O(1)^{1}	68.99(17)	O(4)^{3}-Er(1)-O(6)^{4}	70.1(2)
O(4)^{3}-Er(1)-O(5)^{4}	79.6(2)	O(4)^{3}-Er(1)-O(8)	137.9(5)	O(5)^{4}-Er(1)-O(2)^{1}	82.6(2)
O(5)^{4}-Er(1)-O(6)^{4}	53.0(2)	O(5)^{4}-Er(1)-O(1)^{1}	128.4(2)	O(5)^{4}-Er(1)-O(8)	70.9(5)

Symmetry code:^{1}1/2 -x,1/2 -y,1/2 -z;^{2}-x, -1/2 +y,1/2 -z;^{3}1/2 +x,1 -y,+z;^{4}1-x,1-y,1-z

Table S3. Hydrogen bonds for **Er-MOF** [Å and °]a

D-H···A	d(D-H)	d(H···A)	d(D···A)	<(DHA)
O(8)-H(8B)···O(2)^{1}	0.86	2.49	2.833(19)	105
C(5)-H(5)···O(4)	0.93	2.44	2.763(9)	100
C(7)-H(7)···O(6)^{2}	0.93	2.46	3.351(10)	160

Symmetry code: ^{1} 1/2-x,1/2-y,1/2-z; ^{2}1-x,1-y,1-z

Table S4. Fluorescent lifetime of **Er-MOF** and **ThT@Er-MOF** in different solutions

Sample	B1	T1/ns	B2	T2/ns	T/ns
Er-MOF	1384.7318	21.7982	5.99E+10	1.1847	1.1846
ThT@Er-MOF	1.67E+08	0.5847	1.67E+08	0.5847	0.5847
ThT@Er-MOF+ACh（50nM）	1.53E+03	19.5573	1.35E+09	1.3893	1.3896
ThT@Er-MOF+ ACh（100nM）	1.13E+07	2.1309	2000.33364	25.1301	2.1789
ThT@Er-MOF+ Aβ（50nM）	1.75E+07	0.7167	1.75E+07	0.7167	0.7167
ThT@Er-MOF+ Aβ（100nM）	2.27E+11	1.0063	1045.04781	12.4681	1.0063

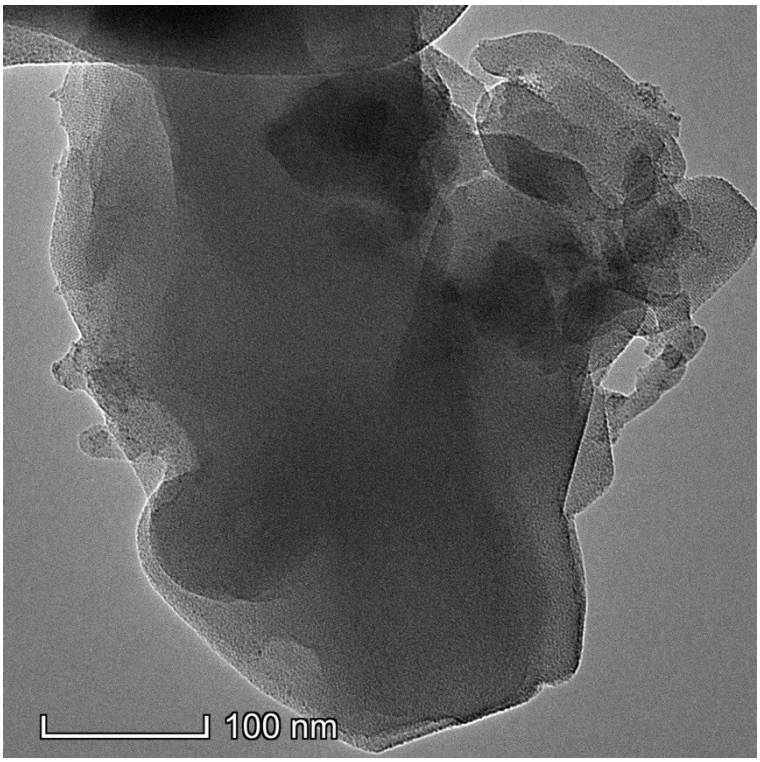

Fig. S1 TEM image of **Er-MOF** synthesized by ultrasonic method.

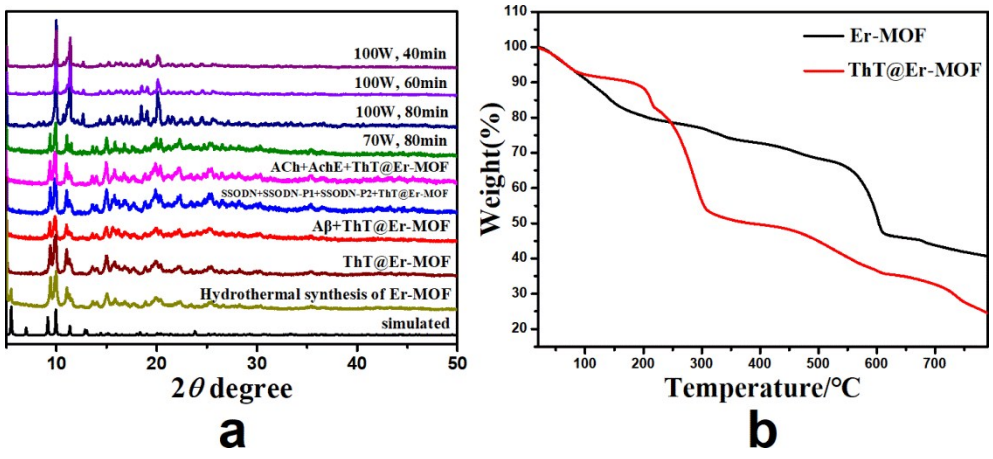

Fig. S2 (a) Experimental PXRD patterns of **Er-MOF** and **ThT@Er-MOF** under

different conditions; (b) TG analysis curves of **Er-MOF** and **ThT@Er-MOF**.

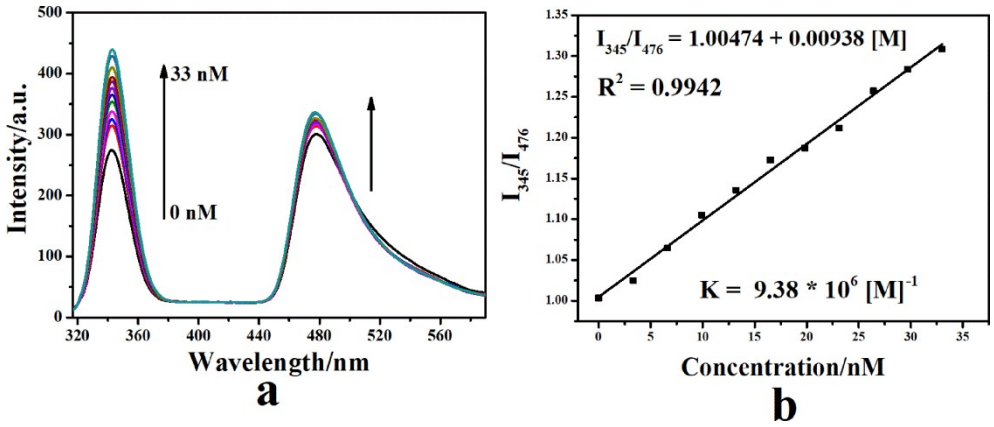

Fig. S3 (a) Fluorescence emission spectra of **ThT@Er-MOF** (0.1 g/L, 3 mL) by the addition of 2 pM SSODN-P and different concentrations of SSODN solution when excited at 310 nm; (b) The linear relation between fluorescence intensity ratio and different concentrations of SSODN solution added into **ThT@Er-MOF**.

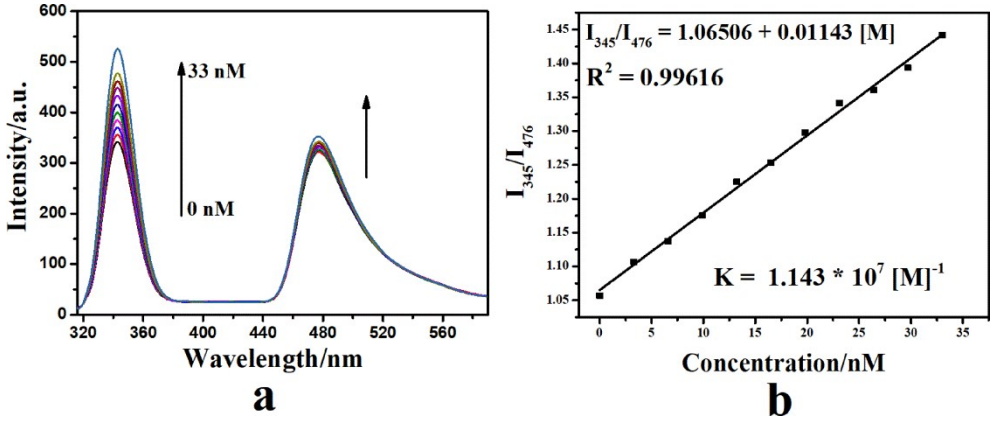

Fig. S4 (a) Fluorescence emission spectra of **ThT@Er-MOF** (0.1 g/L, 3 mL) by the addition of 2 pM SSODN-P1 and 2 pM SSODN-P2 and different concentrations of SSODN solution when excited at 310 nm; (b) The linear relation between fluorescence intensity ratio and different concentrations of SSODN solution added into **ThT@Er-MOF**.

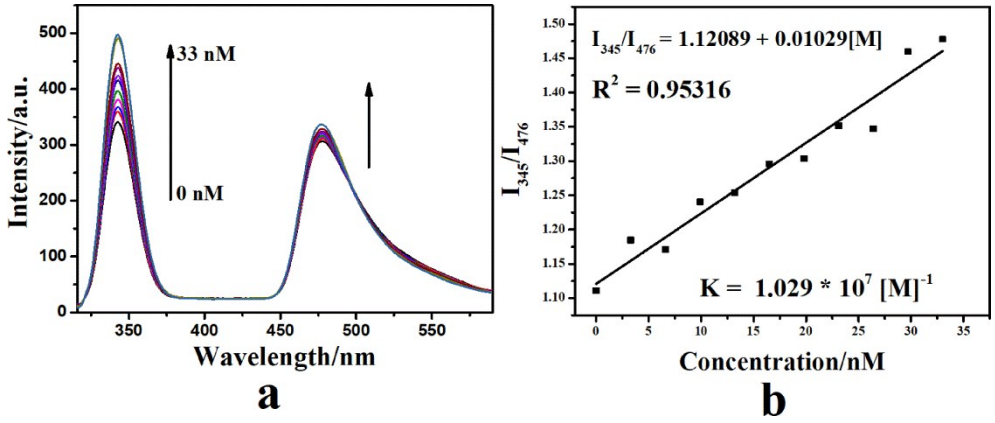

Fig. S5 (a) Fluorescence emission spectra of **ThT@MOF1** (0.1 g/L, 3 mL) by the addition of 2 pM SSODN-P and different concentrations of SSODN-X solution when excited at 310 nm; (b) The linear relation between fluorescence intensity ratio and different concentrations of SSODN-X solution added into **ThT@Er-MOF**.

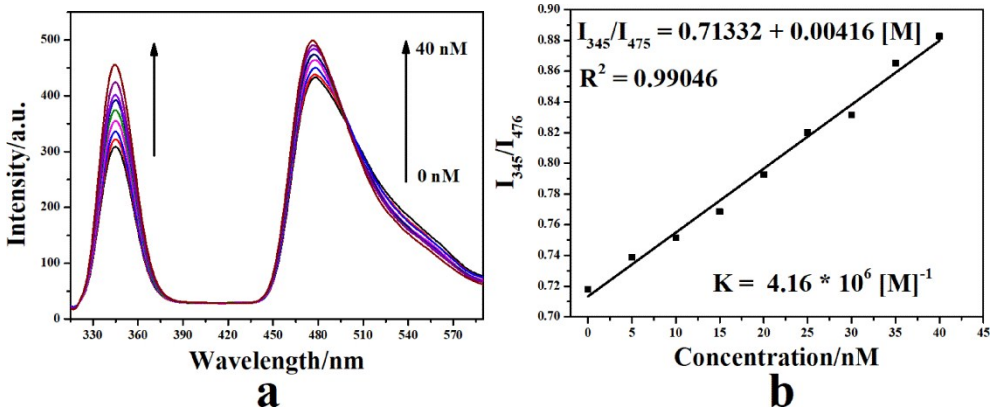

Fig. S6 (a) Fluorescence emission spectra of **ThT@Er-MOF** (0.1 g/L, 3 mL) by the addition of different concentrations of Aβ solution when excited at 310 nm; (b) The linear relation between fluorescence intensity ratio and different concentrations of Aβ solution added into **ThT@Er-MOF**.

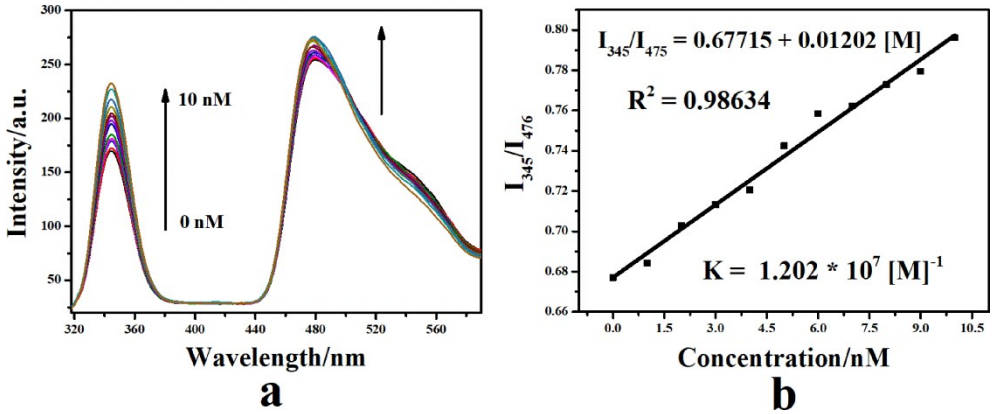

Fig. S7 (a) Fluorescence emission spectra of **ThT@Er-MOF** (0.1 g/L, 3 mL) by the

addition of different concentrations of ACh solution when excited at 310 nm; (b) The linear relation between fluorescence intensity ratio and different concentrations of ACh solution added into **ThT@Er-MOF**.

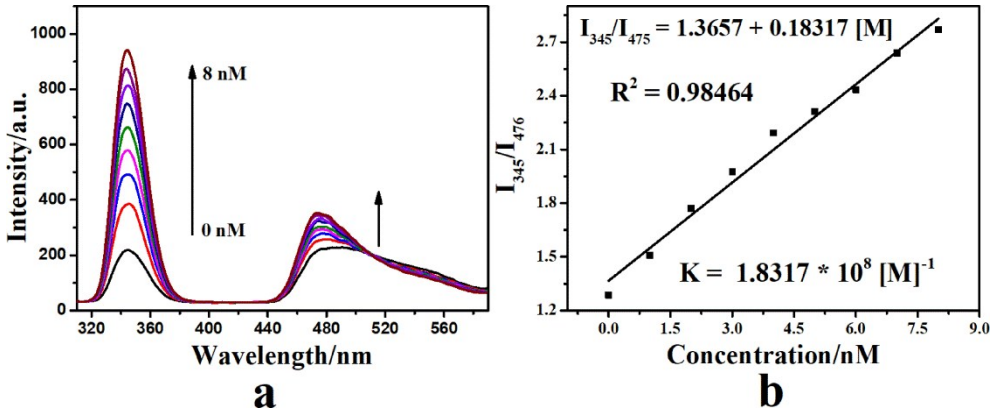

Fig. S8 (a) Fluorescence emission spectra of **ThT@Er-MOF** (0.1 g/L, 3 mL) by the addition of AchE (1U/mL, 0.5μL) and different concentrations of ACh solution when excited at 310 nm; (b) The linear relation between fluorescence intensity ratio and different concentrations of ACh solution added into **ThT@Er-MOF**.