Supporting Information for:

Ultrasound accelerated sugar based gel for *in situ* construction of Eu³⁺-based metallogel via energy transfer in supramolecular scaffold

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Scheme 1 the synthesis procedure of S1.

Synthesis of 1

4-bromo-1, 8-naphthailc anhydride (5g, 18mmol) and 2-aminopyridine(3.39g, 36 mmol) were dissolved in 2-methoxyethanol (80 mL). The above mixed solution was stirred and heated at 110 °C for 8h. After cooled to r. t, the separated solid was filtered. The crude product was subjected to silica column chromatography using CH₂Cl₂: CHCl₃ (50:1) as eluent to afford the pure product as a white solid (4.28g, 51%). Mp: 266-268 °C; ¹HNMR (500M, DMSO, δ): 7.40-7.41(d, 2H, J=7.5 Hz), 7.45-7.47 (m, 1H), 7.88-7.91 (t, 1H, J=7 Hz), 7.93-7.97 (m, 1H), 8.08-8.09 (d, 1H, J=8 Hz), 8.45-8.47 (d, 1H, J=8 Hz), 8.64-8.66 (d, 1H, J=8.5 Hz), 8.70-8.71 (d, 1H, J=8.5 Hz), 8.73-8.74 (d, 1H, J=8.5 Hz). ¹³CNMR (125 M, DMSO-*d*₆): 122.25, 123.12, 124.18, 128.17, 129.44, 130.78, 130.85, 131.22, 131.48, 132.35, 133.75, 138.60, 149.27, 150.00, 163.54, 163.59. HRMS calc. for [C₁₇H₉BrN₂O₂]⁺: 351.9847, 353.9827; Found: 351.9844, 353.9878.

Synthesis of 2

Compound **1** (3.5g, 9.5mmol) and ethylenediamine (30mL) were dissolved in ethanol (100 mL). The above mixed solution was stirred and heated to reflux for 10h, and then evaporated part of solvent. The separated solid was filtered. The obtained solid was subject to silica column chromatography (dichloromenthane/methanol, 5/1, v/v) for purification to give pure intermediate **3** as a yellow solid (1.33g, 42%). Mp: >210 °C ¹HNMR for **2** with HCl (DMSO- d_6 , 500 MHz): 3.60-3.62 (t, 2H, J=6 Hz),4.11-4.13 (t, 2H, J=6 Hz), 6.70-6.72 (d, 1H, J=8.5 Hz), 7.50-7.53 (t, 1H, J=8 Hz), 7.66-7.68

(m, 1H), 8.00 (m, 1H), 8.05-8.06 (d, 1H, J=8.5 Hz), 8.22-8.23 (d, 1H, J=7.5 Hz), 8.33 (m, 2H), 8.68-8.69 (d, 1H, J=8.5 Hz). ¹³CNMR for **2** with HCl (125 M, DMSO- d_6): 37.81, 40.57, 104.25, 108.46, 120.26, 121.56, 124.62, 129.34, 129.39, 130.97, 134.28, 150.41, 163.67, 164.61. HRMS calc. for $[C_{19}H_{16}N_4O_2+H]^+$: 333.1352; Found: 333.1367.

Synthesis of S1

Compound **3** (1g, 3 mmol) and D-(+)-Gluconic acid δ -lactone (536mg, 3 mmol) were dissolved in ethanol (50 mL). The above mixed solution was stirred and heated to reflux for 8h, then the yellow solid was recrystallized in Dimethylformamide for twice (459mg, 30%). Mp> 210 °C ¹HNMR (DMSO-*d*₆, 500 MHz): 3.36-3.60 (m, 5H), 3.92-3.97 (t, 2H, J=6 Hz), 4.36 (d, 1H, J=3 Hz), 4.49-4.55 (t, 2H, J=6 Hz), 5.27 (m, 1H), 5.51 (m, 1H), 6.91-6.93 (d, 1H, J=8.5 Hz), 7.69-7.73 (t, 1H, J=8.5 Hz), 7.86-7.88 (t, J=8 Hz, 1H), 8.14 (m, 1H), 8.27-8.29 (d, 1H, J=8.5 Hz), 8.45-8.46 (d, 1H, J=7 Hz), 8.62-8.64 (d, 1H, J=8.5 Hz). ¹³CNMR: 38.70, 43.27, 63.81, 70.61, 71.92, 72.65, 73.94, 104.20, 105.32, 108.35, 120.45, 122.32, 124.60, 129.84, 131.02, 134.56, 150.98, 163.66, 164.51, 173.50. HRMS calc. for [C₂₅H₂₆N₄O₃+H]⁺: 511.1829; Found: 511.1854.



Synthesis of **3**: 4-Br-1, 8-naphthalic anhydride (277 mg, 1 mmol) and 2pyridinemethanamine (366 mg, 1 mmol) were refluxed in ethanol for 8 hours, the reaction mixture was concentrated and crystalized by ethanol twice, pale yellow solid

was obtained (138 mg, 36%). Mp: 173-175 °C; ¹H NMR (400M, CDCl₃, δ): 5.36 (s, 2H), 7.37-7.38 (d, J = 5.2 Hz, 2H), 7.85-7.89 (t, J = 7.6 Hz, 1H), 8.05-8.07 (d, J = 7.6 Hz, 1H), 8.42-8.44 (d, J = 8 Hz, 1H), 8.55-8.56 (d, J = 4.8 Hz, 2H), 8.60-8.62 (d, J = 8.4 Hz, 1H), 8.67-8.69 (d, J = 7.2 Hz, 1H); HRMS calc. for $[C_{18}H_{11}BrN_2O_2+H]^+$: 367.0082, 369.0062; Found: 367.0072, 369.0051.

Synthesis of 4: Compound 3 (426 mg, 1 mmol), ethylenediamine (600 mg, 10 eq.) were refluxed in ethanol for 48 hours, the reaction mixture was then concentrated and washed with water. The filtrate was purified by column chromatography (SiO₂: CH₂Cl₂/CH₃OH = 10: 1) to yield 4 as a yellow solid (173 mg, 50%). Mp: 217-219 °C; ¹HNMR (500M, DMSO, δ): 2.86-2.85(t, *J* = 6 Hz, 2 H), 3.38-3.40 (t, 2H, *J* = 6 Hz), 5.23 (s, 2H), 6.83-6.86 (d, *J* = 8.8 Hz, 1H), 7.25-7.27 (d, *J* = 4.4 Hz, 2H), 7.69-7.89 (t, *J* = 8.4 Hz, 1H), 8.27-8.29 (d, *J* = 8 Hz, 1H), 8.42-8.44 (d, 1H, *J* = 8 Hz), 8.46-8.47 (d, *J* = 4.4 Hz, 2H), 8.75-8.77 (d, *J* = 8 Hz, 1H); ¹³C NMR (125 M, DMSO-d₆): 43.66, 47.66, 47.79, 105.86, 108.98, 122.07, 123.36, 123.93, 126.15, 130.95, 131.50, 132.86, 136.45, 148.69, 151.48, 153.05, 164.68, 165.69; HRMS calc. for [C₂₀H₁₈N₄O₂+Na]⁺: 369.1327; Found: 369.0063.

Synthesis of S2

Compound **4** (0.8661mmol, 300mg) and D-(+)-Gluconic acid δ -lactone (0.8661mmol, 154mg) were refluxed in ethanol for 14 hours. The mixture was concentrated and washed with water, then the yellow solid was recrystallized in DMF for twice (100 mg, 22%). Mp: 192-194 °C; ¹HNMR (400M, DMSO- d_6 , δ): 3.32-3.58 (m, 5H), 3.91 (d, 2H, J=3.5 Hz), 4.04-4.05 (d, 1H, J=3 Hz), 4.54-4.55 (d, 2H, J=3.5 Hz), 5.23 (s, 2H), 6.93-6.94 (d, 1H, J=8.5 Hz), 7.26 (s, 2H), 7.71-7.74 (t, 1H, J=8.5 Hz), 8.28-8.30 (d, 1H, J=8.5 Hz), 8.46-8.47 (m, 3H, J=5.5 Hz), 8.65-8.67 (d, 1H, J=8 Hz). ¹³C NMR (125 M, DMSO- d_6): 42.29, 43.26, 63.83, 70.63, 71.96, 72.66, 73.93, 104.49, 107.93, 120.67, 122.09, 122.55, 124.97, 129.28, 129.86, 131.53, 135.09, 147.29, 150.08, 151.45, 163.35, 164.33, 173.43.

Table S1 the gelation properties of S1 and S2 (25 mg/mL) in different organic solvents.

	S1		S2	
Solvent	H-C	S	H-C	S
acetone	Ι	Ι	Ι	Ι
chloroform	Ι	Ι	Ι	Ι
n-propanol	Р	Р	Ι	Ι
isopropanol	Ι	Ι	Ι	Ι
methylbenzene	Ι	Ι	Ι	Ι
ethanol	Р	G	Ι	Ι
methanol	Р	Р	Ι	Ι
ethyl acetate	Ι	Ι	OG	Р
benzene	Ι	Ι	Ι	Ι
dioxane	Ι	Ι	Ι	Ι
petroleum ether	Ι	Ι	Ι	Ι

Note: H-C, heating-cooling process; S, sonication; P: precipitate; I: Insoluble; G: gel; OG: opaque gel.



Fig. S1 a) the corresponding fluorescence spectra; b) UV-vis spectra of **S2** solution (10⁻⁴ M), **S2** T-gel (25 mg/mL), and **S2** T-gel (25 mg/mL) with Eu³⁺ (100 mg/mL).



Fig. S2 SEM image of S1 precipitate from ethanol (25 mg/mL).



Fig. S3 IR spectra of S1 precipitate from ethanol, S-xerogel, and S-xerogel with Eu³⁺.



Fig. S4 IR spectra of S2 powder and T-xerogel.



Fig. S5 XRD data of S1 precipitate and S1 S-xerogel.



Fig. S6 Temperature dependent fluorescence changes of S1 S-gel (25 mg/mL).



Fig. S7 the fluorescence spectra of S1 S-gel (25 mg/mL) with different amount of Eu^{3+} ions.



Fig. S8 the fluorescence spectra of S1 S-xerogel and S1 S-xerogel with Eu^{3+} .

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with Eu³⁺.

Amount of	2.5 mg/mL	15 mg/mL	25 mg/mL	40 mg/mL	100 mg/mL
Eu(NO ₃) ₃	-ie ing/iii	10 110 1110	-0		100 119 112
Time required	160 min	110 min	88 min	70 min	55 min

Compounds	$\lambda_{ m abs}$	$\lambda_{ m em}$	t
	(nm)	(nm)	
S1 (solution)	436	523	8.67 ns
S1 (solution with	436	523	7.74 ns
Eu ³⁺)			
S1 (gel)	436	548	1.64 ns
S1 (gel with Eu^{3+} , 3	389,	608	16.8 µs,
mg)	512		2.34 µs
S1 (gel with Eu^{3+} , 5	398,	610	13.9 µs
mg)	512		1.7 µs
S1 (gel with Eu^{3+} , 10	398,	618	12.5µs
mg)	512		1.0 µs

Table S3 The photophysic properties of S1 and S1 with Eu^{3+}



Fig. S9 Temperature dependent fluorescence changes of S1 S-gel (5 mg/200 $\mu L)$ doped with $Eu^{3+}.$



Fig. S10 ¹HNMR Spectra of S1 in DMSO- d_6 .



Fig. S11 ¹HNMR Spectra of S2 in DMSO- d_6 .