Supporting information

An Easy to Make Strong White AIE Supramolecular Polymer Act as Colour Tunable Photoluminescence Materials

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Materials and General Methods:

Materials: 4-aminopyridine, trimesoyl chloride, DMF, triethylamine, ethyl alcohol, Tb^{3+}, Eu^{3+}, La^{3+}, Ce^{3+} and Th^{4+} and acids were reagent grade and used as received. Solvents were either employed as purchased or dried by $CaCl_2$. Fresh double distilled water was used throughout the experiment. Nuclear magnetic resonance (NMR) spectra were recorded on Varian Mercury 400 instruments. Mass spectra were recorded on a Bruker Esquire 6000 MS instrument. The infrared spectra were performed on a Digilab FTS-3000 Fourier transform-infrared spectrophotometer. Melting points were measured on an X-4 digital melting-point apparatus (uncorrected). Fluorescence spectra were recorded on a Shimadzu RF-5301PC spectrofluorophotometer. Study of scanning electron microscopy (SEM), Determination of the SEM images was performed on a JSM-6701F FE-SEM microscope.

Preparation of water suspension of DTB: About 10 mg of **DTB** was weighed out in a test bottle. Then, 2.0 mL deionized water was added into that test bottle followed by shaking for 1−3 min at room temperature, producing a viscous and milky suspension (0.5%).

Preparation of supramolecular polymer hydrogel (DTB-G): The **DTB** (0.0876 g, 2 $\times 10^{-4}$ mol) was added into the pure water (200 μL), after stirring about 4-5 min at room temperature, the mixture was heated to 90-95 ^{o}C, then cooled it to room temperature, obtained the supramolecular polymer hydrogel (**DTB-G**) (1 M).

Preparation of hydrogel based on Tb^{3+}, Eu^{3+}, La^{3+} and Ce^{3+}: To a solution of Tb^{3+}, Eu^{3+}, La^{3+} and Ce^{3+} (20 μL, 0.1 M) was added into the emission of **DTB** (200 μL,

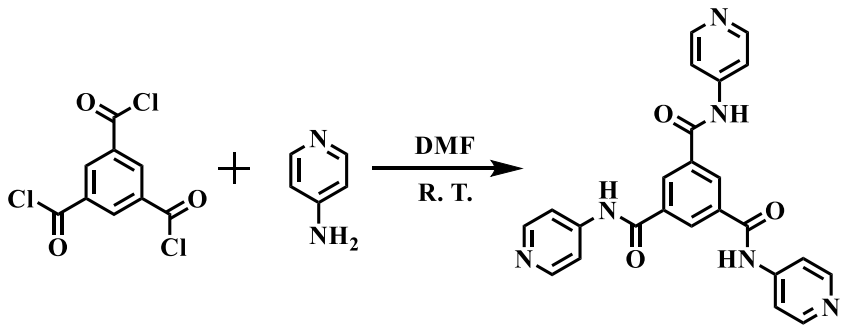
0.5 %). The mixture of emission and Tb^{3+}, Eu^{3+}, La^{3+} and Ce^{3+} was heated to obtain a colorless solution, cooling the above solution to give white hydrogel.

Preparation of colorless solution of DTB based on Th^{4+}: To a solution of rare-earth metals Th^{4+} (20 μL, 0.1 M) was added into the emission of **DTB** (200 μL, 0.5 %). The mixture of emission and Th^{4+} was heated to obtain a colorless solution, cooling the above solution to give colorless solution of **DTB** based on Th^{4+}.

Fluorescence titration: A serious of the gel with different equivalents guests were prepared by dissolving **DTB** (2 mg) and proper equivalent of guest in water (400 μL). Then record their fluorescence intensity at 467 nm.

Preparation of the 365 nm ultraviolet LED coated with the DTB and serious of DTB-Ms: a serious of models of **DTB** and **DTB-M**s prepared from the xerogel were coated onto the LED lamp, upon illumination, it emits bright multicolor light including white-light.

Results and Discussion:



Scheme S1. The synthesis of **DTB.**

The gelator **DTB** was synthesized by simple classical reaction between 4-aminopyridine and trimesoyl chloride. To a solution of mixture of trimesoyl chloride (0.2639 g, 1.0 mmol) and triethylamine (1-2 d) was slowly dropwise added

into the solution of 4-aminopyridine (0.3105 g, 3.3 mmol) in DMF (10 mL), the mixture was stirred at room temperature for 12 h, appearing a pale solid. The solid is vacuumed suction filtration and washed with cold ethyl alcohol (10 ml), finally the product solid was followed by drying in a vacuum oven at 40 °C for 24 h. Yield: 0.0421g (96%). M.P.: 167 °C. ^{1}H NMR (400 MHz, DMSO-d_6, room temperature) δ (ppm): 11.78 (s, 3 H), 8.99 (s, 3 H), 8.68 (m, 6 H), 8.25 (m, 6 H); ^{13}C NMR (DMSO-d_6, 150MHz): 165.68, 149.58, 135.07, 131.36, 114.75; ESI-MS m/z: [M]+ Calcd: $C_{24}H_{18}N_6O_3$: 439.14, found 439.19; IR (anhydrous KBr, cm^{-1}) v: 3421 (w) (N-H), 3080 (w) (C-H on pyridyl and phenyl group), 1710 (w) (C=O), 1508 (w) (C=N on pyridyl).

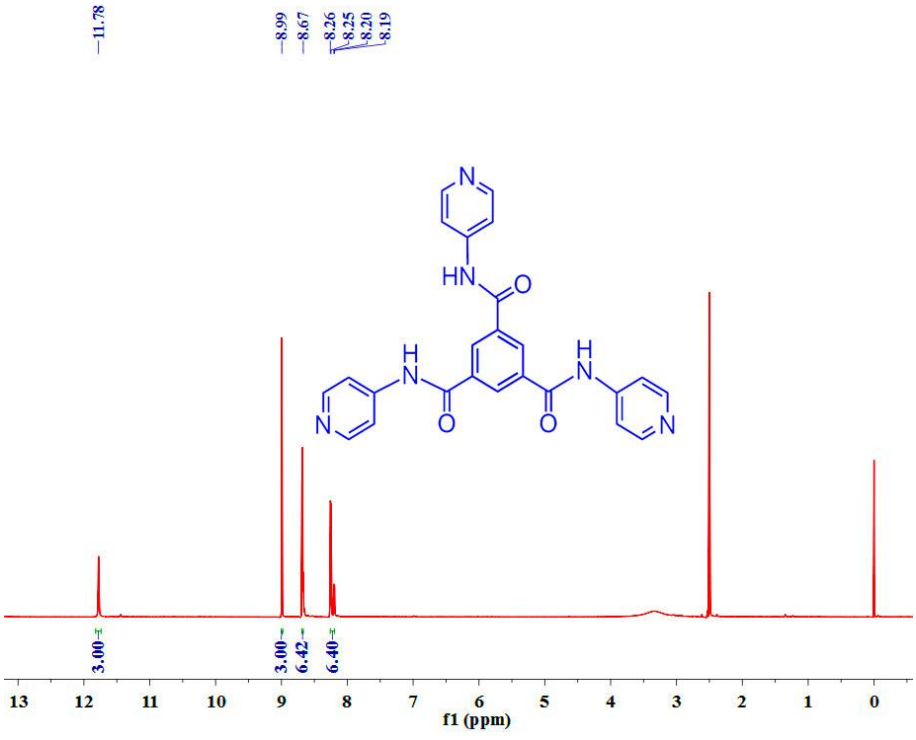


Figure S1. ^{1}H NMR Spectrum of **DTB**.

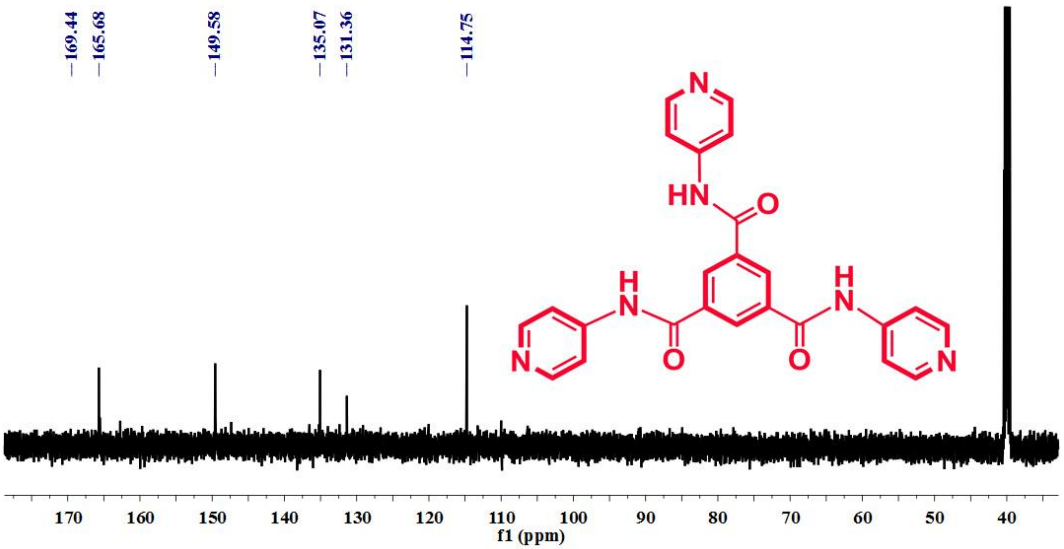


Figure S2. ^{13}C NMR Spectrum of **DTB**.

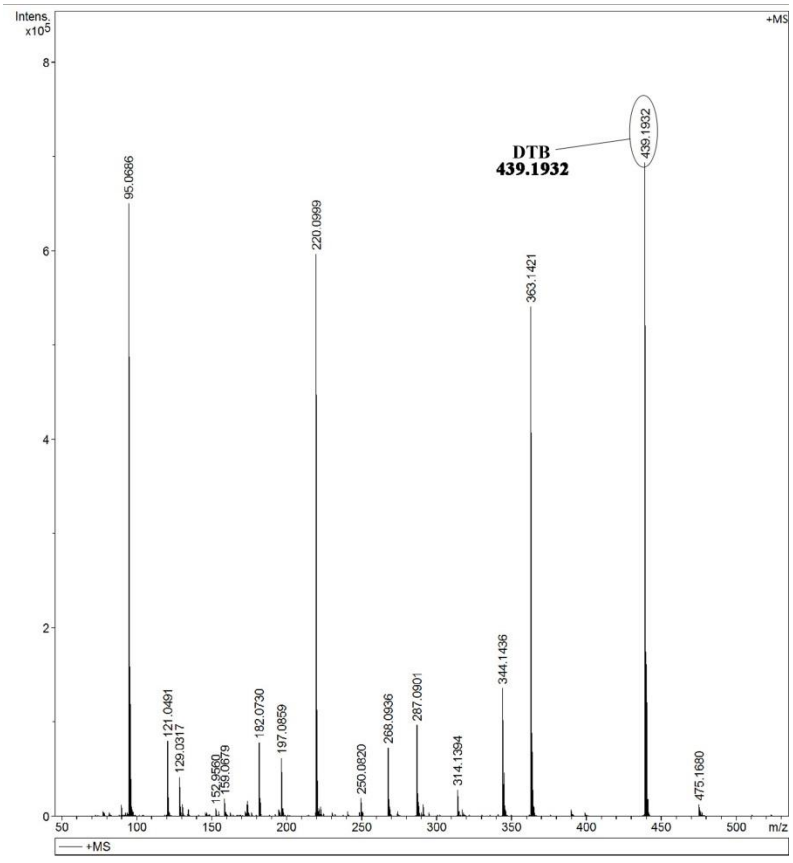


Figure S3. Mass Spectrum of **DTB.**

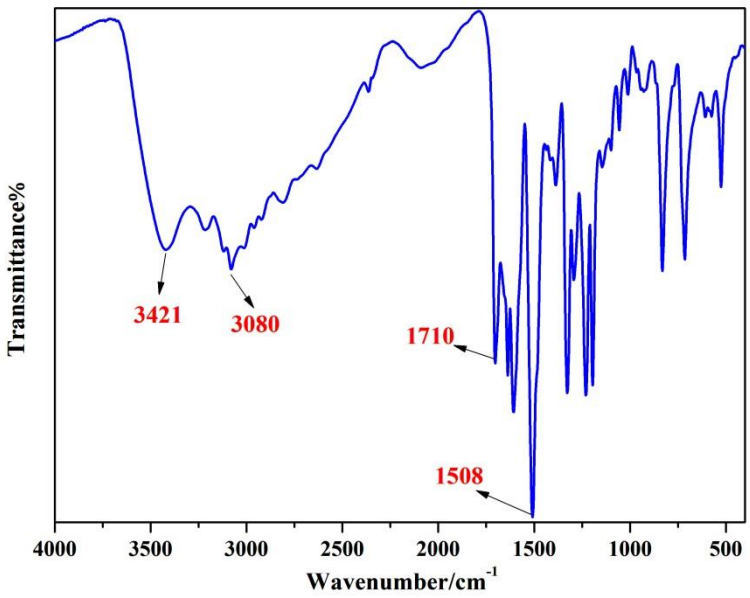


Figure S4. IR Spectrum of **DTB**.

Table S1. Gelation Property of supramolecular metallo-hydrogel**.**

Ion	Solution	State	CGC(%)	Tgel(℃)
Tb^{3+}	H_2O	G	0.5%	58.5
Eu^{3+}	H_2O	G	0.5%	76.1
La^{3+}	H_2O	G	0.5%	56.1
Ce^{3+}	H_2O	G	0.5%	53.7

G=gelation

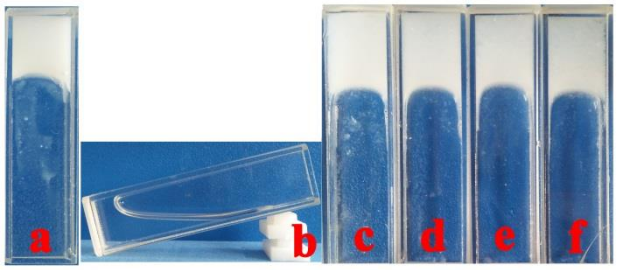


Figure S5. Photographs of: a, **DTB-G**; b, solution of **DTB-Th**; c, gel of **DTB-Tb**; d, gel of **DTB-Eu**; e, gel of **DTB-La**; f, gel of **DTB-Ce**.

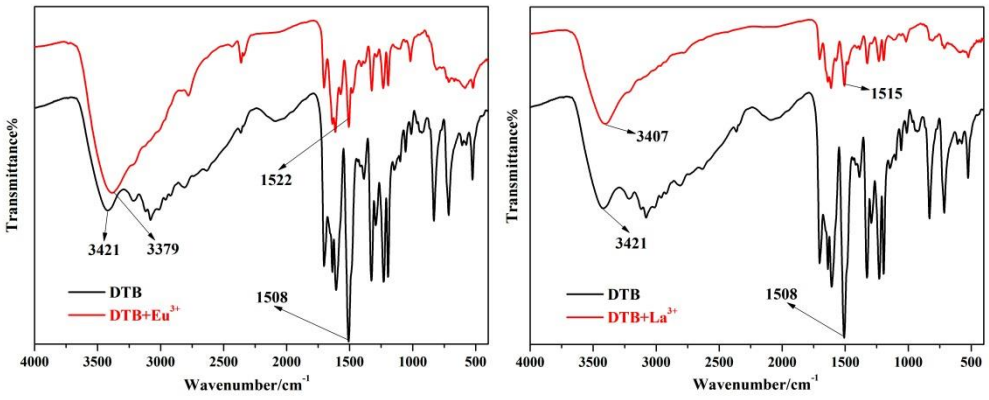


Figure S6. FT-IR spectra of **DTB** and xerogel of **DTB-Ms:** (a) **DTB-**Eu, (b) **DTB-**La.

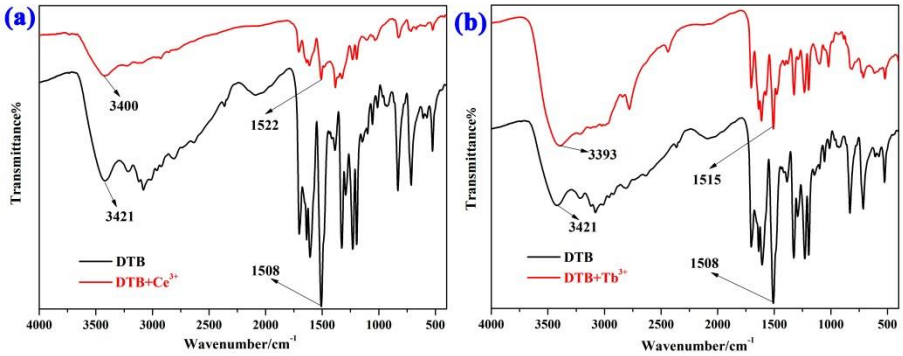


Figure S7. FT-IR spectra of DTB and xerogel of **DTB-Ms:** (a) **DTB-**Ce, (b) **DTB-**Tb.

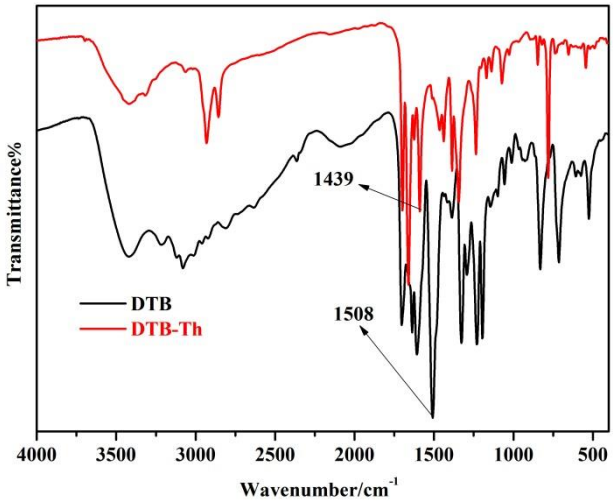


Figure S8. FT-IR spectra of **DTB** and xerogel of **DTB-**Th.

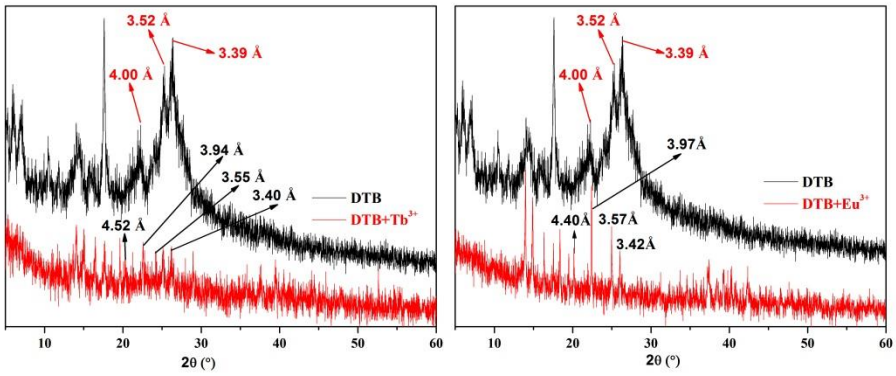


Figure S9. The Powder XRD patterns of **DTB** and xerogel of **DTB-**Tb or **DTB-**Eu.

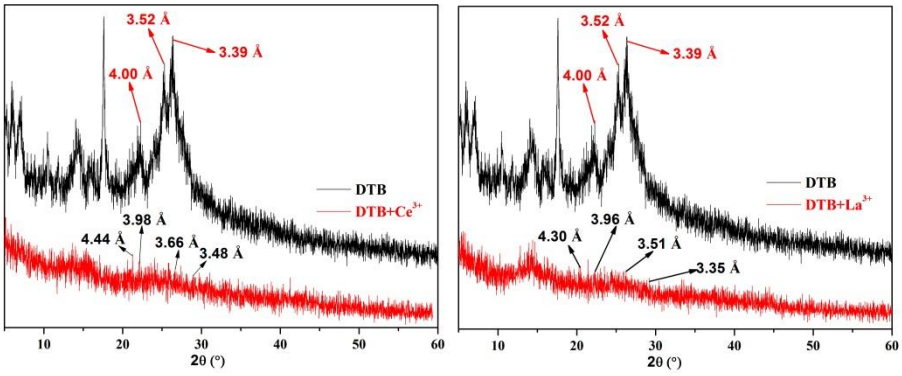


Figure S10. The Powder XRD patterns of **DTB** and xerogel of **DTB-**Ce or **DTB-**La.

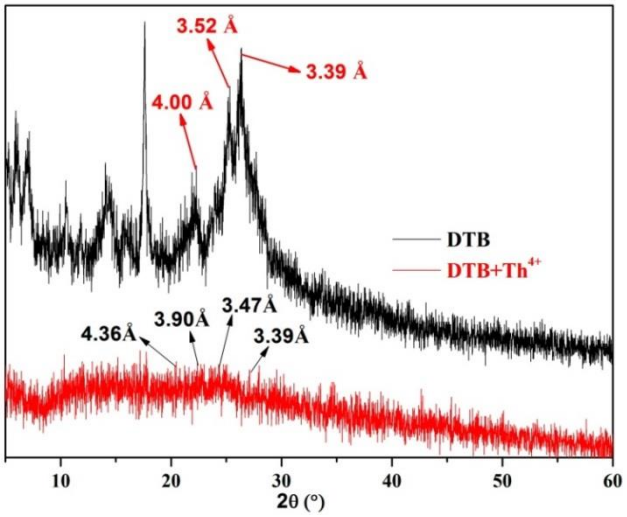


Figure S11. The Powder XRD patterns of **DTB** and xerogel of **DTB-**Th.

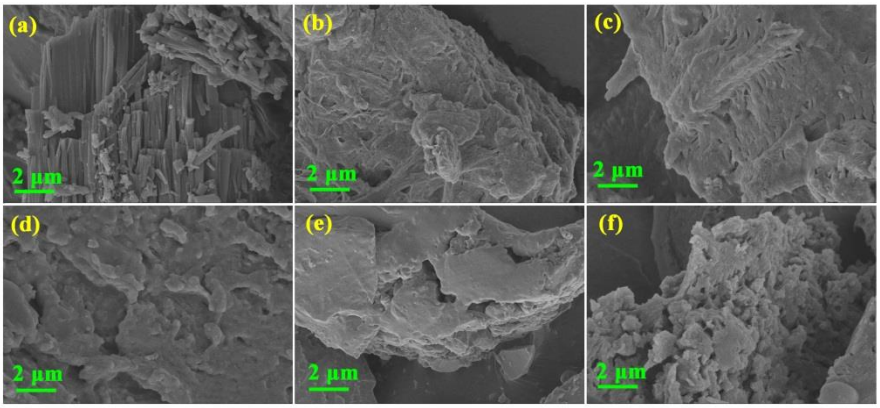


Figure S12. SEM images of xerogel (a) **DTB**, (b) **DTB-Tb**, (c) **DTB-Eu**, (d) **DTB-La**, (e) **DTB-Th** (powder), (f) **DTB-Ce**.