

*Electronic Supplementary Information (ESI)*

## Spontaneous Chiral Self-Assembly of Achiral AIEgens for AIEgens-Silica Hybrid Nanotubes

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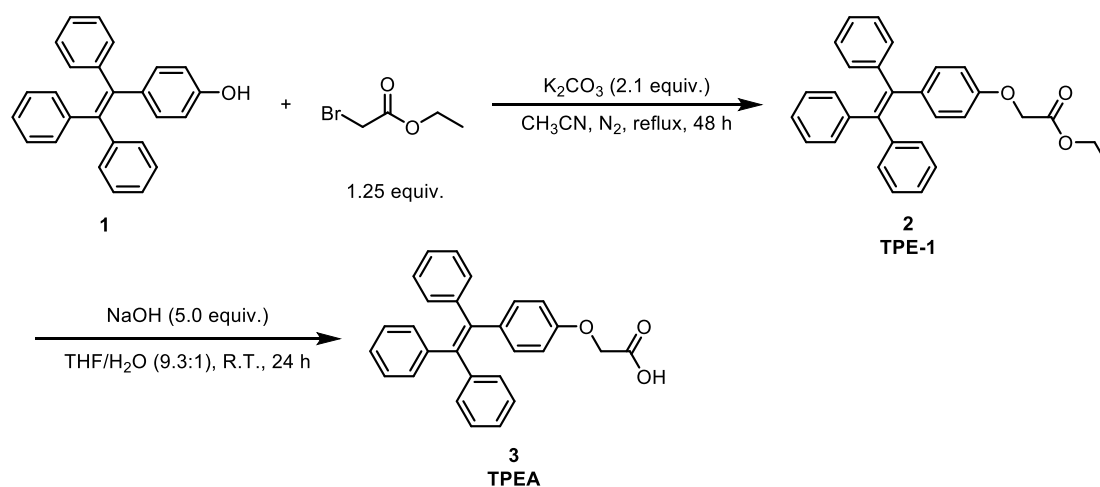
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## Experimental section

### Synthesis of TPEA.



A general synthesis: The three-neck flask charged with 1-(4-Hydroxyphenyl)-1,2,2-triphenylethane (3.5 g, 10.0 mmol) and  $K_2CO_3$  (3.0 g, 21.0 mmol) was evacuated and filled with  $N_2$ . Then ethyl bromoacetate (2.1 g, 12.5 mmol) and 50 ml acetonitrile were added in three-neck flask and refluxed at 100 °C under an  $N_2$  atmosphere for 2 days. After the reaction, the mixture was cooled to room temperature and concentrated in vacuo, and then the crude product was purified by a silica gel column using ethyl acetate /petroleum ether (1/10, v/v) as eluent to afford a white solid intermediate 1 (TPE-1), 3.64 g of TPE-1 was dissolved in 140 ml of tetrahydrofuran, and  $NaOH$  (2.0 g, 50.0 mmol) was dissolved in 15 ml of water to prepare an alkali solution. The above tetrahydrofuran solution was added to the alkali solution, and the mixture was stirred at room temperature for 24 hours, and then the mixed solution was poured into deionized water. In water, the pH was adjusted to 2 with hydrochloric acid, a white solid (TPEA) was precipitated, and the solid was filtered and washed three times with water (or the organic solvent was extracted with dichloromethane) and the solvent was evaporated.

### Synthesis of CASN compounds.

The CASN can be synthesized according to molar compositions of Template:  $NaOH$ : TMAPS: TEOS:  $H_2O$ =1: 1: 1.5: 7: 24000. In a typical synthesis, TPEA (30.0 mg) was dissolved in deionized water (30 mL) added 0.074 mL 1M  $NaOH$  (aq) while stirring at room temperature.

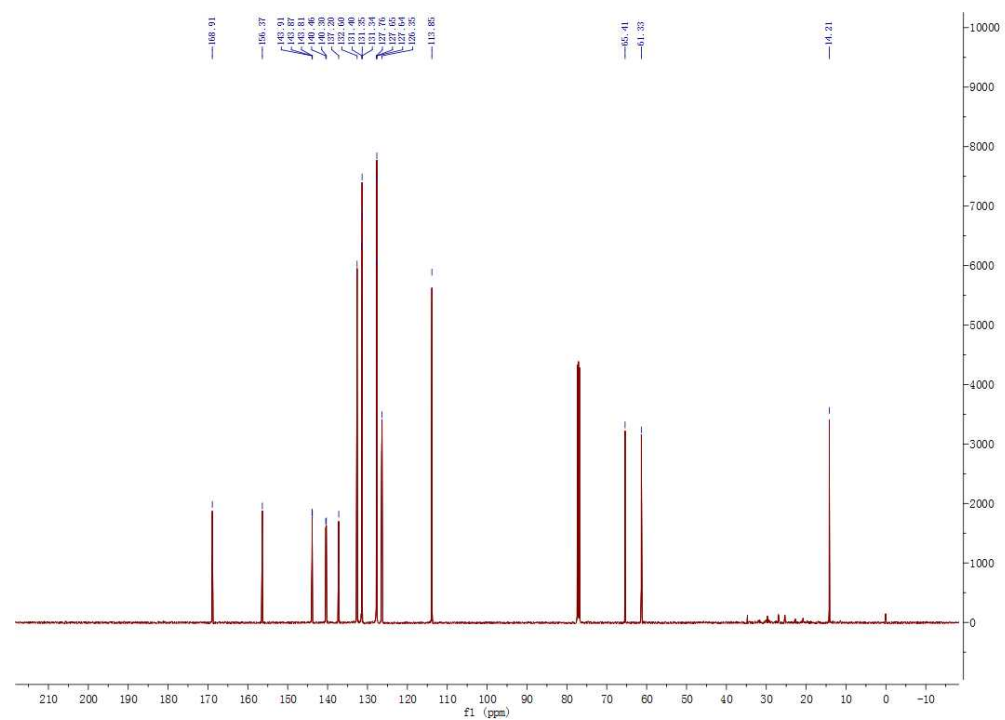
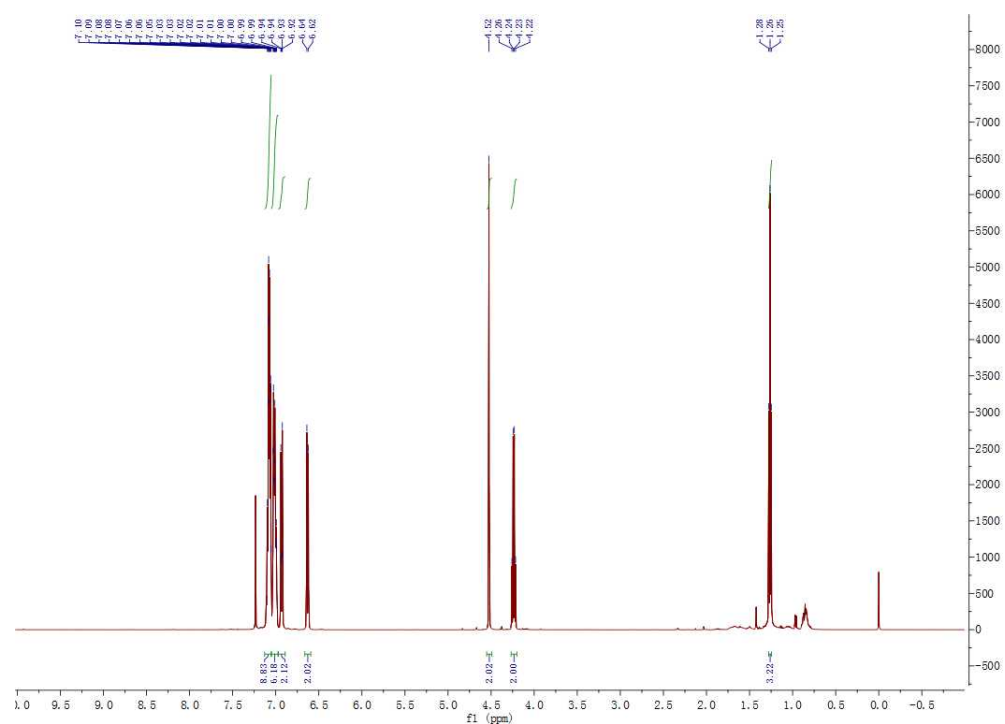
After stirring for 15 min, TMAPS (61 mL) and TEOS (132 mL) were added into the homogeneous solution and the mixture was stirred for another 2 hours. Then the mixture reacted at 110 °C for 1 days under static conditions. Then the autoclave was cooled, and the white product was centrifuged and washed with deionized water until the pH = 7 and vacuum freeze dried.

### **Synthesis of TPEA and CASN films**

1 mg TPEA and CASN were dispersed with 1 mL water in the test tubes, then were dropped on the glass respectively. They were dried into the white TPEA and CASN films. These films were taken these photographs under natural light and 365 nm UV light respectively.

### **Characterization.**

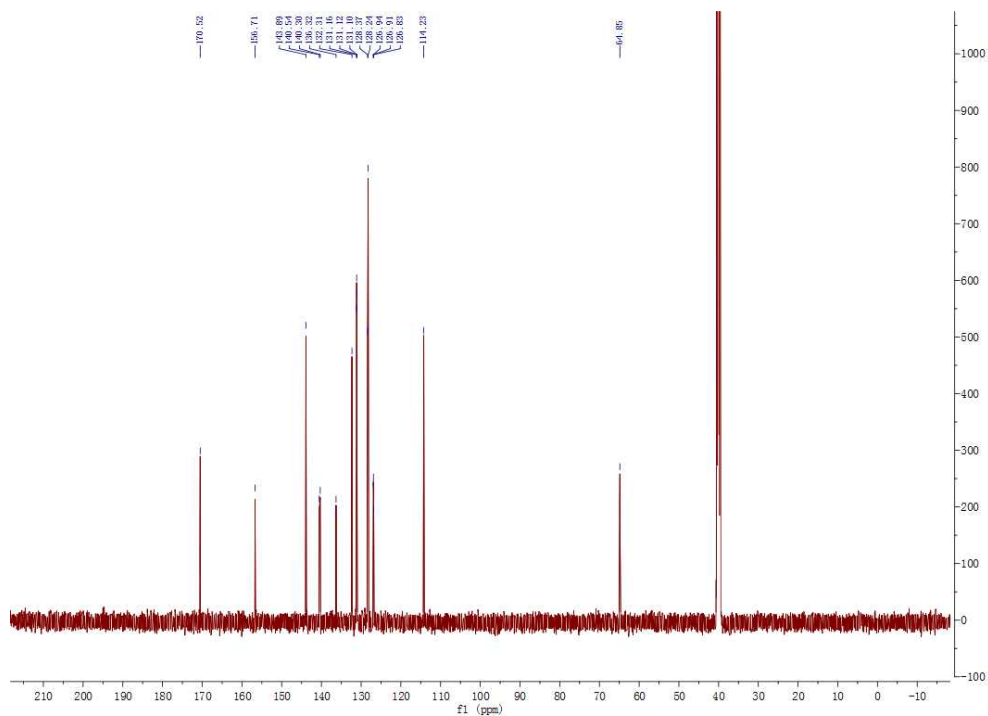
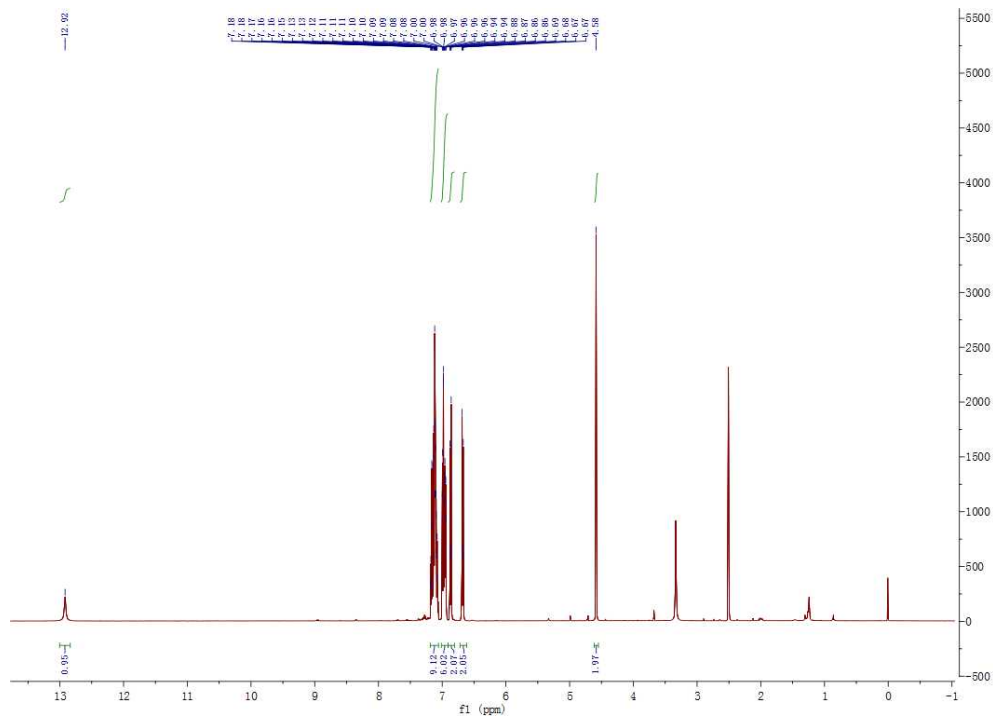
Powder XRD patterns were recorded on a Rigaku X-ray diffractometer (D/max-2200/PC) equipped with a Cu K $\alpha$  radiation source (40 kV, 30 mA,  $\lambda = 0.15418$  nm) and lowest detection angle of 0.6°. SEM was conducted on a JEOL JSM-7100F electron microscope operating at 1 kV, TEM observations were performed using a JEOL JSM-F200 microscope.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were recorded using a Varian MERCURY plus-400 (400 MHz) spectrometer and an AVANCE III 500 (500 MHz) spectrometer. The chemical shifts are reported in ppm relative to the residual deuterated solvent and the internal standard tetramethylsilane. The elemental results of TPEA were performed using an Elemental Analysis (\*Vario EL Cube). Ultraviolet/visible absorption spectra of dilute water solutions of surfactants were recorded using a TU-1810 spectrometer, whereas the UV/Vis absorption spectra of the pure surfactant solid and hybrids were measured using a Lambda 750S spectrophotometer. Thermogravimetric analysis was performed using a TGA 7 thermogravimetric analyser (Perkin Elmer, Inc., USA). The heating rate was 20 °C/min. Excitation and emission spectral analysis was performed on a LS 55 Luminescence Spectrometer (Perkin Elmer, Inc., USA). Quantum efficiencies and fluorescence lifetimes were recorded using a steady-state & time-resolved fluorescence spectrofluorometer (PTI, USA) with a calibrated integrating sphere system. Fluorescence confocal laser scanning images were recorded using a super-resolution multiphoton confocal microscope ((Leica)/TCS SP8 STED 3X). The photographs were taken on the phone. The DRCD spectra were taken on a JASCO J-815 spectropolarimeter fitted with DRCD apparatus. The CPL spectra were measured on JASCO CPL-300.



**Fig. S1**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of TPE-1

$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.13 – 7.05 (m, 9H), 7.05 – 6.97 (m, 6H), 6.97 – 6.89 (m, 2H), 6.63 (d,  $J$  = 8.8 Hz, 2H), 4.52 (s, 2H), 4.24 (q,  $J$  = 7.1 Hz, 2H), 1.26 (t,  $J$  = 7.1 Hz, 3H).

$^{13}\text{C}$  NMR (126 MHz,  $\text{CDCl}_3$ )  $\delta$  168.91, 156.37, 143.91, 143.87, 143.81, 140.46, 140.30, 137.20, 132.60, 131.40, 131.35, 131.34, 127.76, 127.65, 127.64, 126.35, 113.85, 65.41, 61.33, 14.21



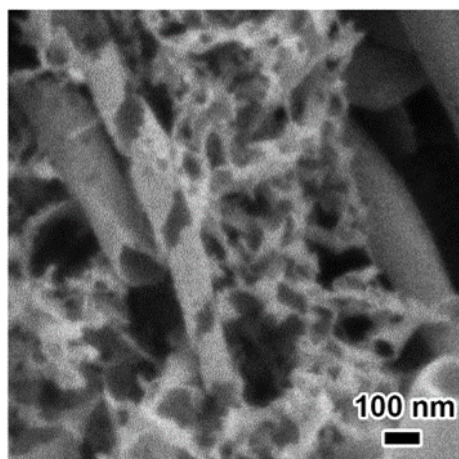
**Fig. S2**  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of TPEA

$^1\text{H}$  NMR (500 MHz, DMSO)  $\delta$  12.92 (s, 1H), 7.18 – 7.06 (m, 9H), 7.01 – 6.91 (m, 6H), 6.91 – 6.81 (m, 2H), 6.72 – 6.62 (m, 2H), 4.58 (s, 2H).

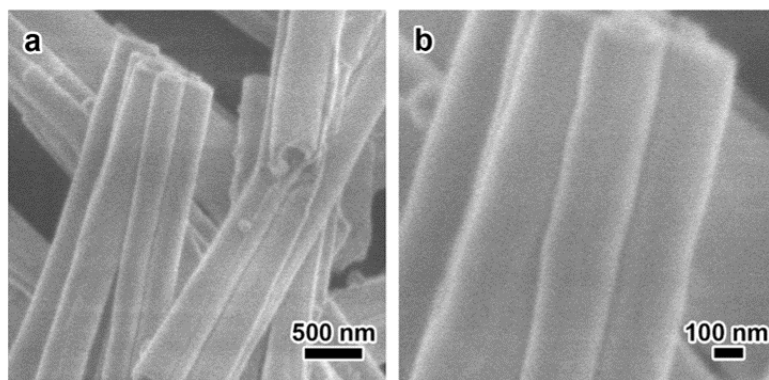
$^{13}\text{C}$  NMR (126 MHz, DMSO)  $\delta$  170.52, 156.71, 143.89, 140.54, 140.30, 136.32, 132.31, 131.16, 131.12, 131.10, 128.37, 128.24, 126.94, 126.91, 126.83, 114.23, 64.85

**Table 1** The elemental analysis results of the TPEA.

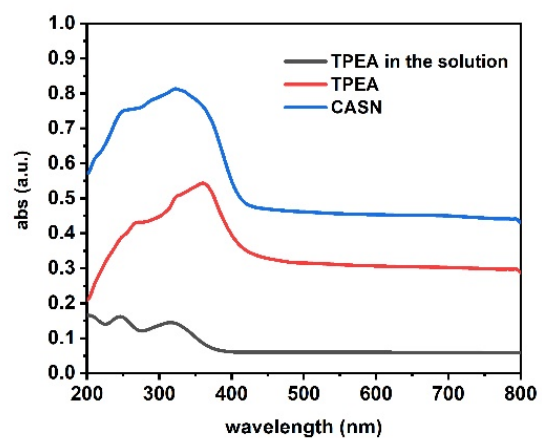
Element	C	H	O
The experimental mass fraction	83.3 %	5.9 %	10.8 %
The theoretical mass fraction	82.7 %	5.4 %	11.8 %



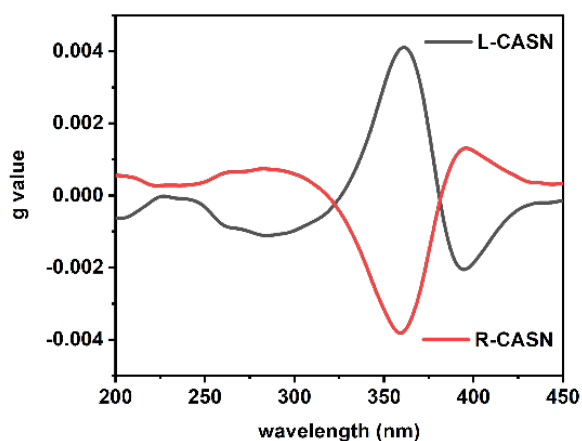
**Fig. S3** the SEM image of the right-hand ribbon.



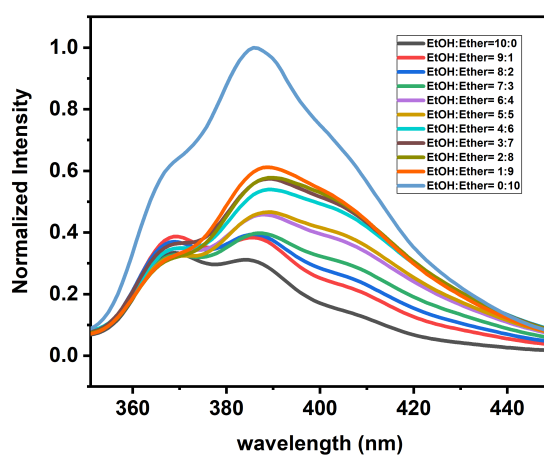
**Fig. S4** the SEM images of R-CASN.



**Fig. S5** the ultraviolet-visible absorption spectra of TPEA in a dilute water solution (black), in pure TPEA solid (red) and in CASN (blue).



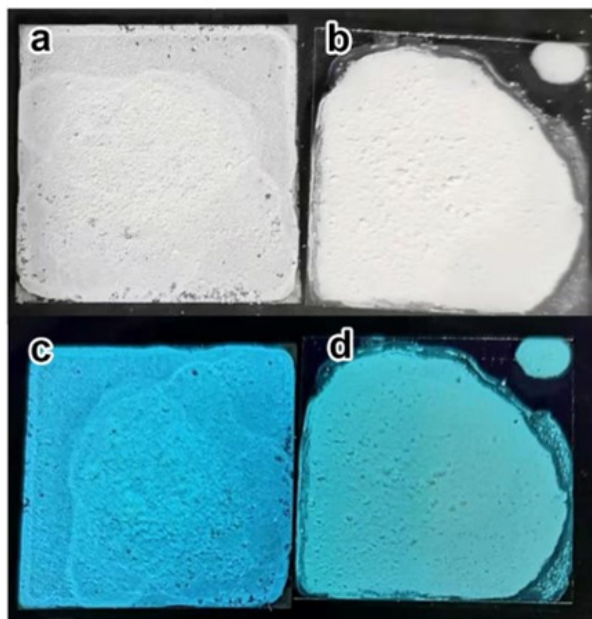
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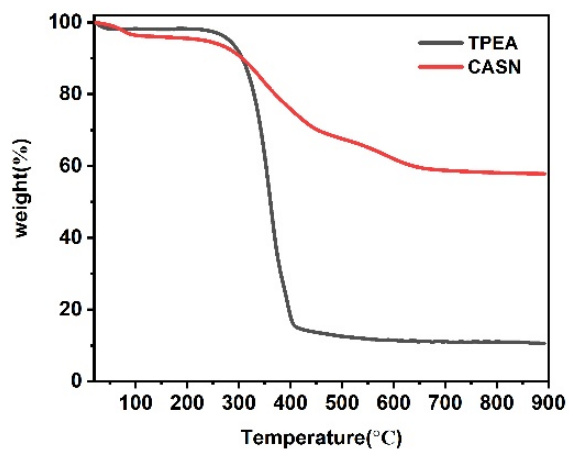
**Fig. S7** the emission spectra of solution of TPEA (10  $\mu$ M) in ethanol-ether mixtures.

**Table 2** The photophysical data of the two forms of TPEA and CASN.

Compound	$\lambda_{ex}$ / nm	$\lambda_{em}$ / nm	lifetime	$\Phi_f$
TPEA	366 nm	443 nm	4.41 ns	0.41
CASN	366 nm	453 nm	5.58 ns	0.57

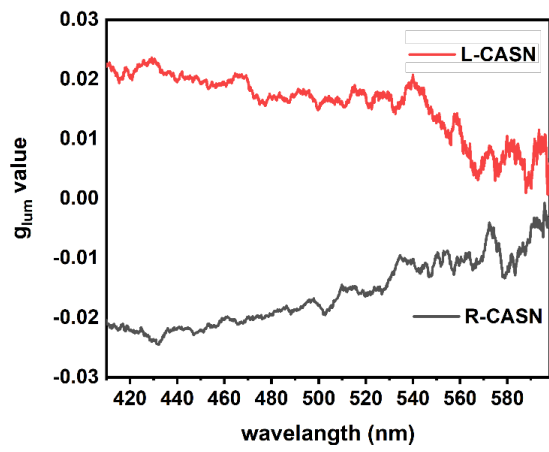


**Fig. S8** the photographs of TPEA (a) and CASN (b) under the natural light, TPEA (c) and CASN (d) under 365 nm UV light.



**Fig. S9** the TGA curves of TPEA and CASN.





**Fig. S10** the  $g_{lum}$  value of the antipodal CASN.