

# **Electronic Supplementary Information (ESI)**

**Application of Amide-Modified Bifunctional Star-Shaped**

**Triazine Derivatives in Fe<sup>3+</sup> Ions Detection and Optical**

**Power Limiting**

Xiaoyi Hu, Lai Hu, Shimao Zhao, Yang Sun, Senqiang Zhu, Rui Liu, Hongjun Zhu

*Materials*

All solvents were dried according to standard procedures before use. All air-sensitive reactions were carried out under a nitrogen atmosphere using a Schlenk line. Column chromatography was performed using silica gel (200–300 mesh). Other reagents and solvents were purchased from Sinopharm Chemical Reagent Co. Ltd. and used without further purification.

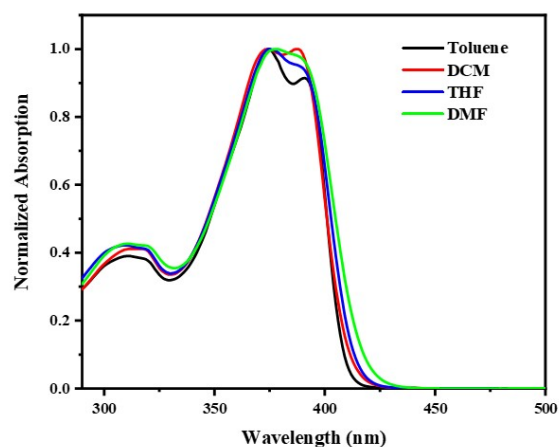
### **Synthesis**

#### *Synthesis of 2,4,6-tris(7-bromo-9,9-dihexyl-9H-fluoren-2-yl)-1,3,5-triazine (2):*

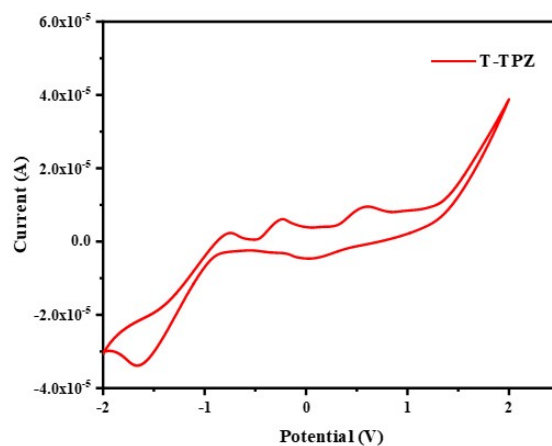
The compound 7-bromo-9,9-dihexyl-9H-fluorene-2-carbonitrile (4 g, 9.15 mmol) was added to a 100 mL two-neck flask with 50 mL dry CH<sub>2</sub>Cl<sub>2</sub>. The flask was evacuated and backfilled with argon. 8 mL CF<sub>3</sub>SO<sub>3</sub>H was added slowly under the ice bath. After the addition, the reaction mixture was stirred for 24 hours at room temperature. TLC detection indicated the disappearance of the compound 1. Saturated sodium bicarbonate solution was used to quench the reaction and adjust the pH to 7. The mixture was then washed with water and extracted with CH<sub>2</sub>Cl<sub>2</sub> three times. The combined organic solution dried over anhydrous sodium sulfate and concentrated in *vacuo*. The residue was purified by column chromatography with petroleum (b.p. 60–90°C) to give a white solid with a yield of 62.14%. <sup>1</sup>H NMR (400 MHz, Chloroform-*d*) δ 8.86 (dd, *J* = 8.0, 1.5 Hz, 3H), 8.75 (d, *J* = 1.5 Hz, 3H), 7.93 (d, *J* = 8.0 Hz, 3H), 7.72 (d, *J* = 8.0 Hz, 3H), 7.61 – 7.51 (m, 6H), 2.30 – 1.95 (m, 12H), 1.22 – 1.02 (m, 36H), 0.84 – 0.65 (m, 30H).

#### *Synthesis of N-(4-ethynylphenyl)-3,4,5-tris(hexadecyloxy)benzamide (5):*

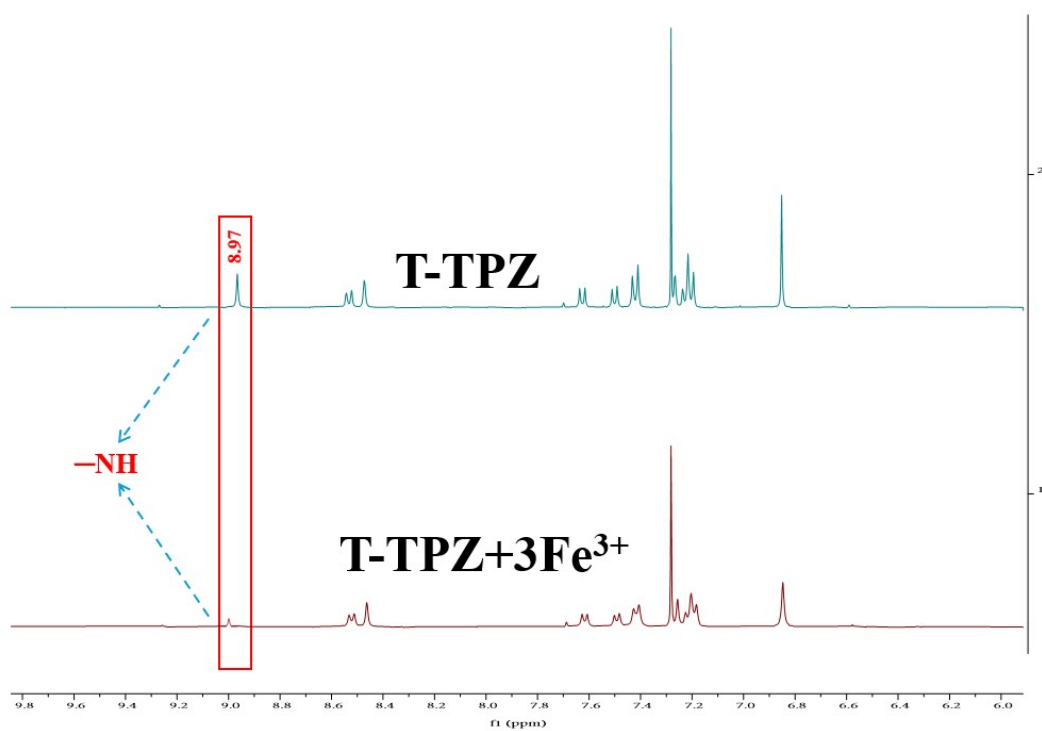
The compounds 3,4,5-tris(dodecyloxy)benzoic acid (1.4 g, 2.07 mmol), para-aminophenylacetylene (0.2 g, 1.71 mmol), EDC·HCl (0.5 g, 2.60 mmol), and DMAP (0.2 g, 1.64 mmol) were weighed and placed in a 50 mL single-neck round-bottom flask. To this mixture, 20 mL of CH<sub>2</sub>Cl<sub>2</sub> was added. The reaction was carried out under nitrogen atmosphere, with stirring at room temperature for 48 hours. The reaction progress was monitored by TLC. Upon completion, the reaction mixture was poured into water and extracted with CH<sub>2</sub>Cl<sub>2</sub>. The organic layer was separated and evaporated under reduced pressure to yield a crude product, which was then purified by column chromatography, resulting in 0.63 g of white solid with a yield of 47.7%. <sup>1</sup>H NMR (400 MHz, Chloroform-*d*) δ 7.84 (s, 1H), 7.67 – 7.59 (m, 2H), 7.56 – 7.48 (m, 2H), 7.04 (s, 2H), 4.03 (t, *J* = 6.5 Hz, 6H), 3.09 (s, 1H), 1.89 – 1.69 (m, 6H), 1.49 (tt, *J* = 10.1, 6.0 Hz, 6H), 1.30 (d, *J* = 8.6 Hz, 48H), 0.90 (t, *J* = 6.8 Hz, 9H).



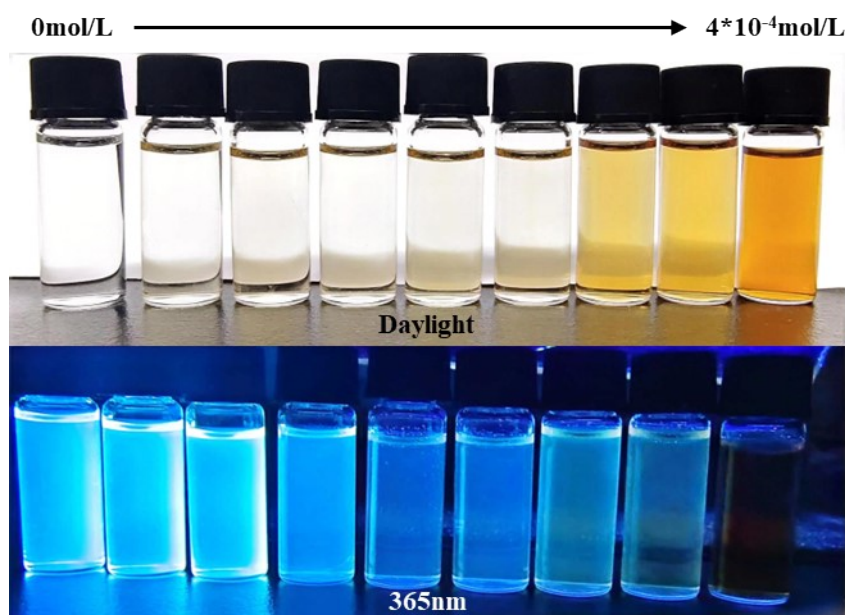
**Fig. S1** Normalized UV-vis absorption spectra of **T-TPZ** in different solvents.



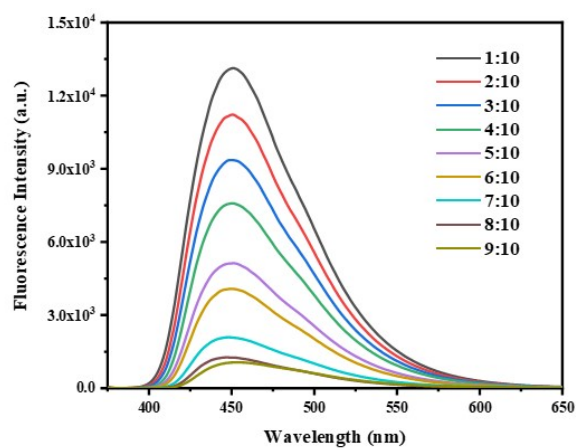
**Fig. S2** Cyclic voltammograms of **T-TPZ** ( $1 \times 10^{-5}$  M) in THF at 298 K,  $\text{Bu}_4\text{NPF}_6$  (0.1 M), scan rate =  $100 \text{ mV s}^{-1}$ , the reference electrode is Ag/AgCl, the working electrode is glassy carbon, the auxiliary electrode is platinum wire, and the internal reference is ferrocene.



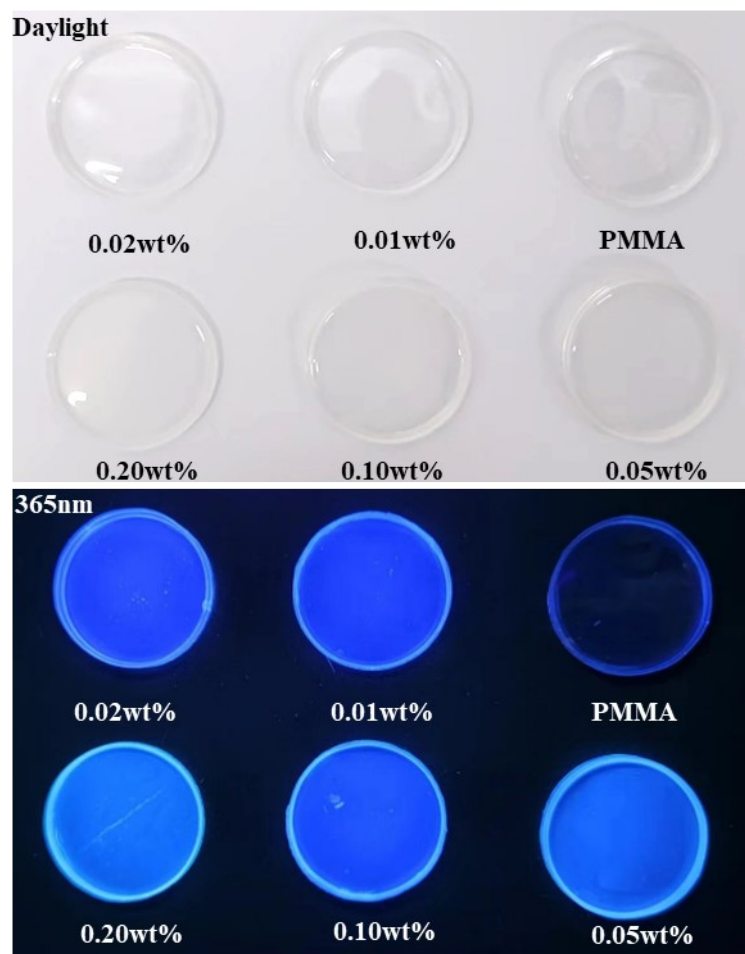
**Fig. S3**  $^1\text{H}$  NMR of T-TPZ with  $\text{Fe}^{3+}$  (3 eq.) in  $\text{CDCl}_3/\text{THF}$  (50:50%).



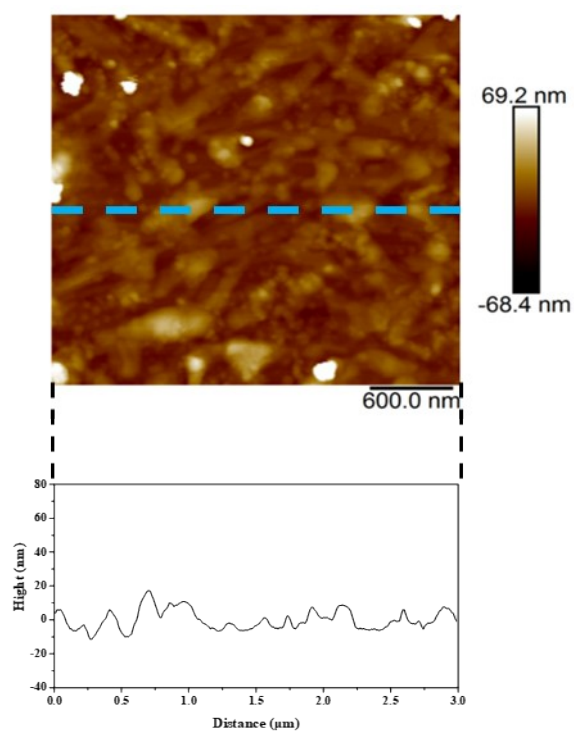
**Fig. S4** Photos of T-TPZ ( $1 \times 10^{-5}$  M) in the presence of different concentrations of  $\text{Fe}^{3+}$  ( $0 - 4 \times 10^{-4}$  M) under daylight and irradiation by 365 nm light.



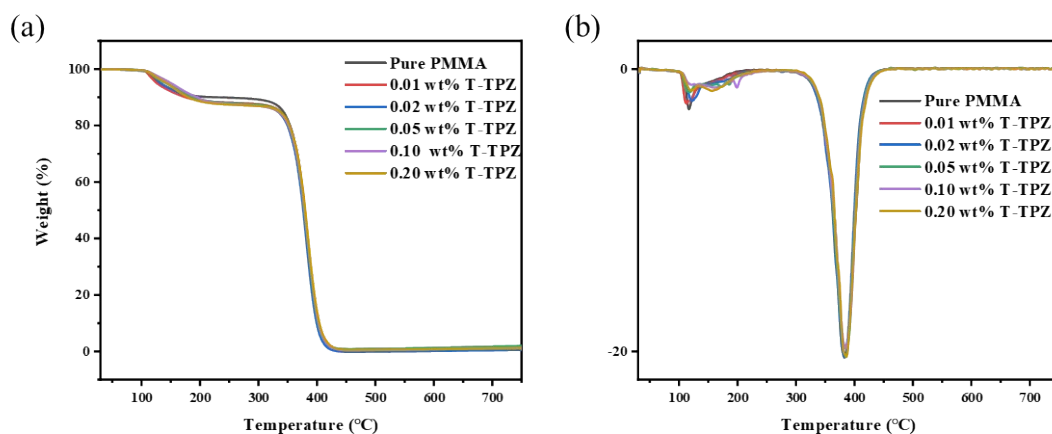
**Fig. S5** The fluorescence emission spectra of different ratios of  $[\text{Fe}^{3+}]: [\text{T-TPZ} + \text{Fe}^{3+}]$  (1:10, 2:10, 3:10, 4:10, 5:10, 6:10, 7:10, 8:10, and 9:10) ( $\lambda_{\text{ex}} = 375$  nm).



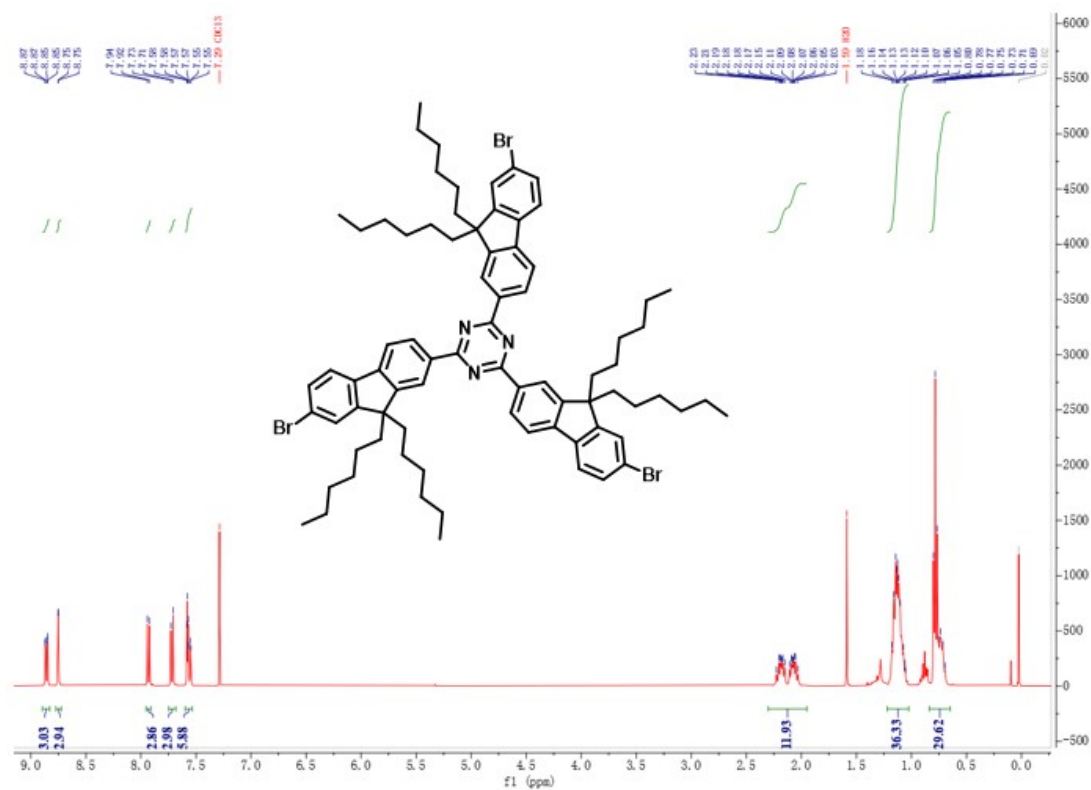
**Fig. S6** Photos of T-TPZ/PMMA films (0.01 wt%-0.20 wt%) under daylight and irradiation by 365 nm light.



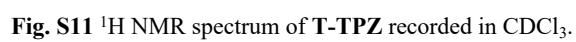
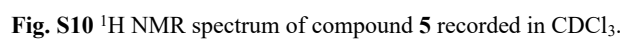
**Fig. S7** AFM images of Two-dimensional image of an area of  $3 \times 3 \mu\text{m}^2$  and the surface roughness as a function of gray scale.

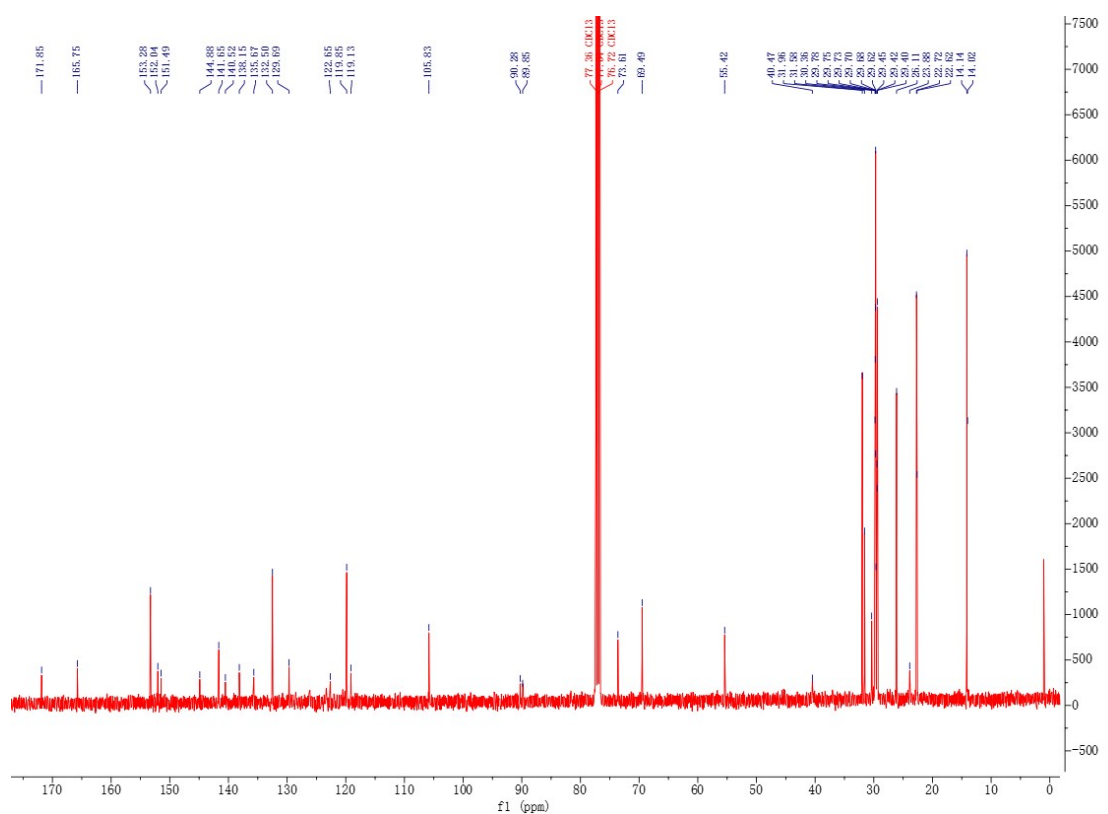


**Fig. S8** (a) TG and (b) DTG curves of T-TPZ/PMMA films with various dye concentrations.

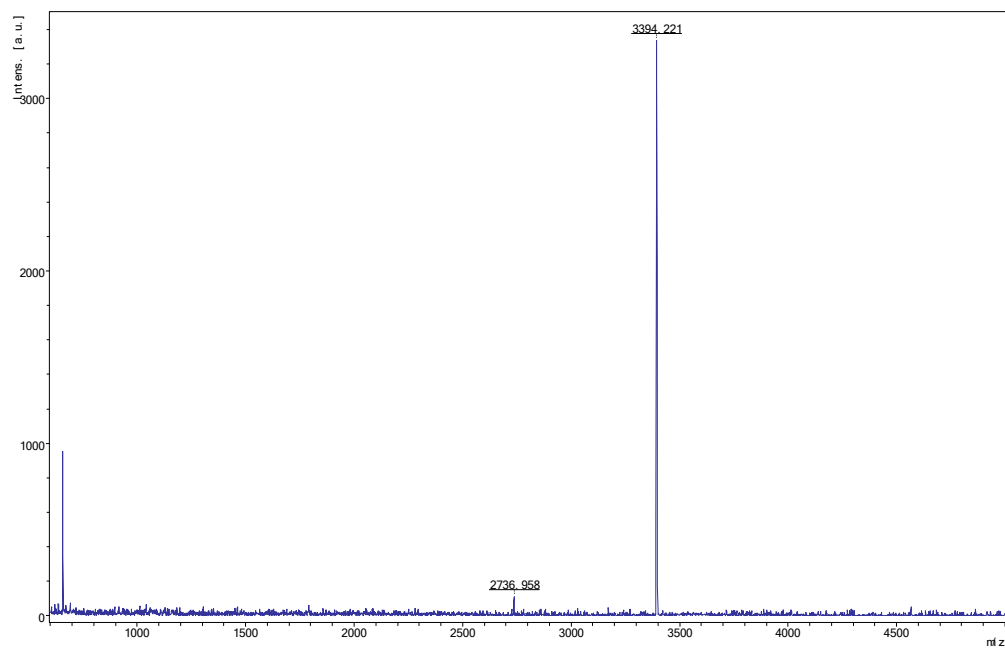


**Fig. S9**  $^1\text{H}$  NMR spectrum of compound **2** recorded in  $\text{CDCl}_3$ .

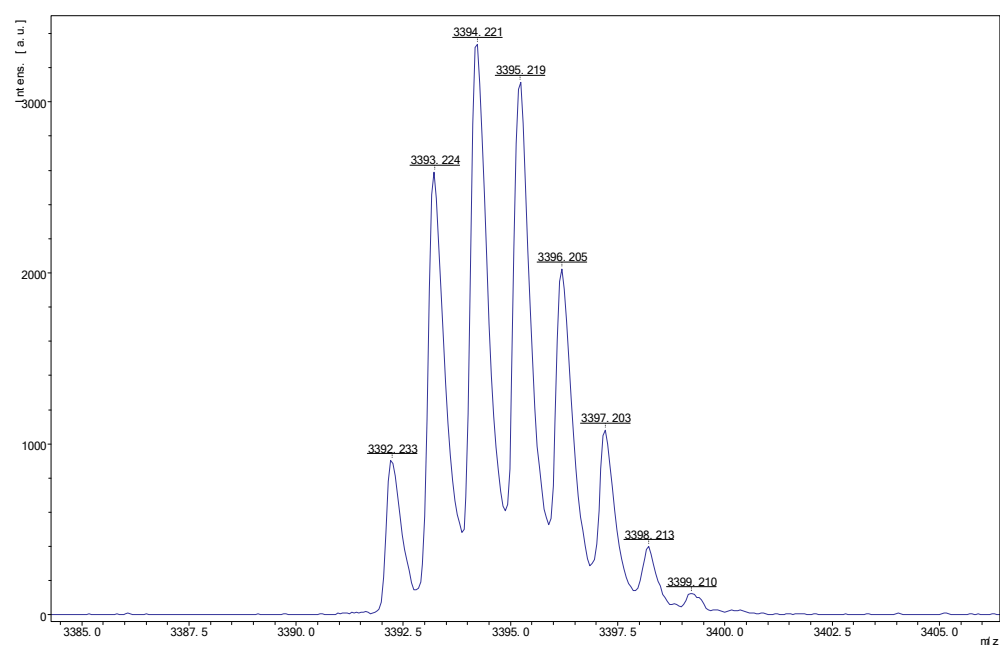




**Fig. S12** <sup>13</sup>C NMR spectrum of T-TPZ recorded in CDCl<sub>3</sub>.







**Fig. S13** MALDI mass spectrometry of **T-TPZ**.