RSC Adv

Supplementary Information

A π-extended luminogen with colorimetric and off/on fluorescent multi-channel detection for Cu^{2+} in high selectivity and sensitivity via nonarylamine-based organic mixed-valence

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1 Optical Spectra

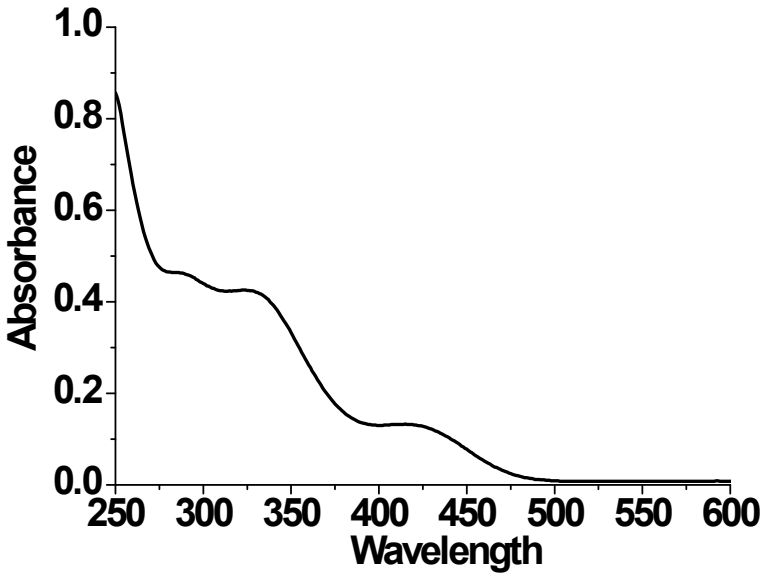

Figure. S1 UV-vis spectra of ITP-TPE (2×10^{-5} M) in CH_3CN solution.

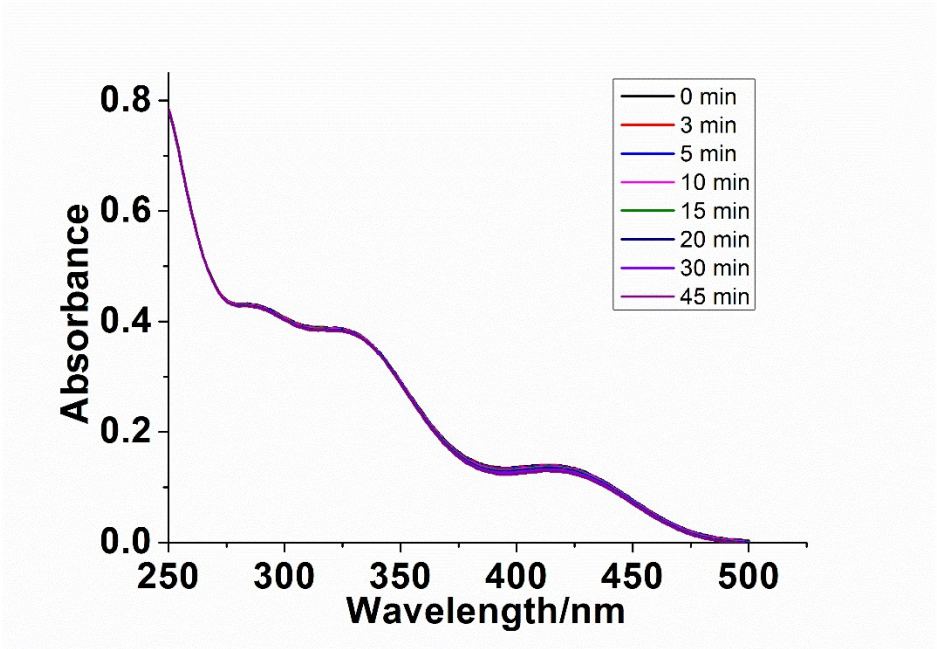

Figure. S2 UV-vis spectra of ITP-TPE (2×10^{-5} M) in CH_3CN solution at different irradiation time.

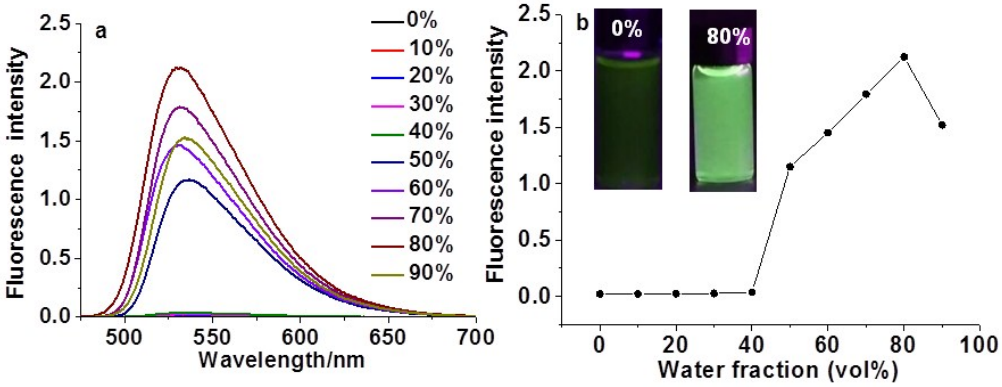

Figure.S3 Fluorescence spectra of ITP-TPE (a) in CH_3CN–water mixtures (1.0×10^{-5} M, with varied volumetric fractions of water; (b) the fluorescence intensity change spectra of ITP-TPE at different content of water.

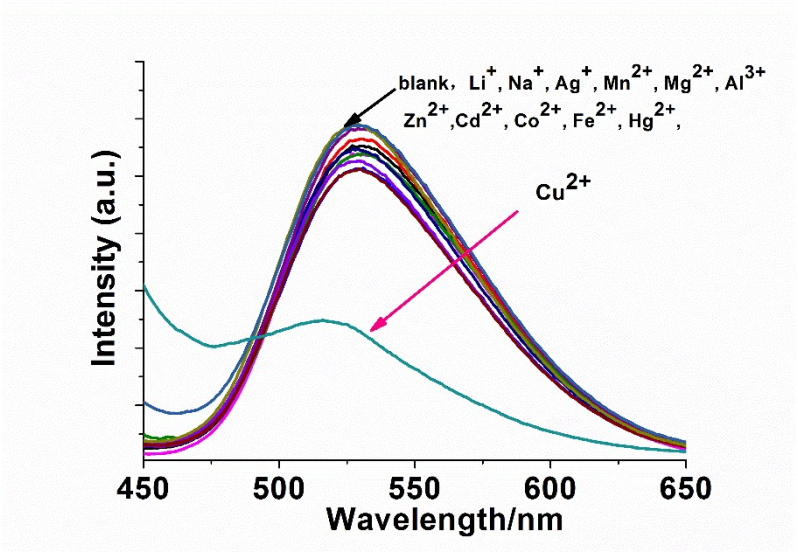

Figure.S4 Back titration fluorescence spectra of ITP-TPE (2×10^{-5} M) in CH_3CN–water (9:1) solution upon addition of 1 equiv. of various metal ions.

Detection Limit Calculation for This Method [S1]:

Through fluorometric titrations, the detection limit for Cu^{2+} was determined. According to the definition, detection limit = $3S_{bi}/k$, where S_{bi} is standard deviation of 6 blank measurements and k is the slope obtained from the calibration curve. In this method, the standard deviation S_{bi} of 671 and the slope from the graph k of 48478 are calculated. Therefore, the detection limit = 4×10^{-7} M (R = 0.98) can be obtained.

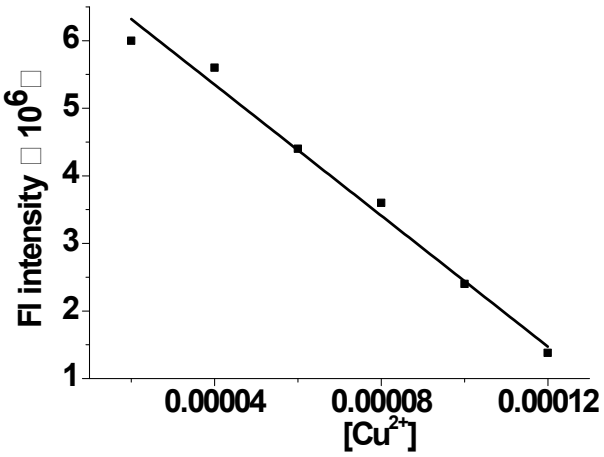

Figure. **S5** Linear relationship between fluorescence intensity of ITP-TPE (2×10^{-5} M in CH_3CN) at 402 nm and the concentration of Cu^{2+} ($0.1 – 2 \times 10^{-5}$ M) in CH_3CN.

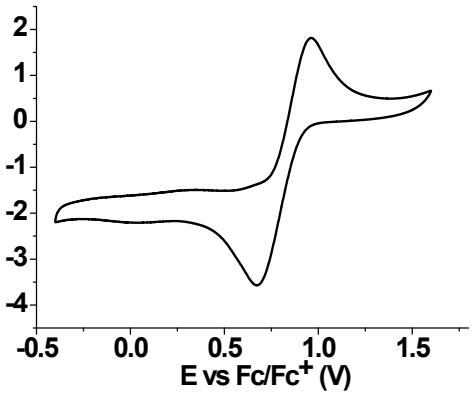

Figure. S6 Cyclic voltammograms of Cu $(CF_3SO_3)_2$ measured in CH_3CN (0.1 mol/L n-Bu_4NPF_6) at a scan rate of 100 mV/s.

2 ^{1}H and ^{13}C NMR Spectra for New Compounds

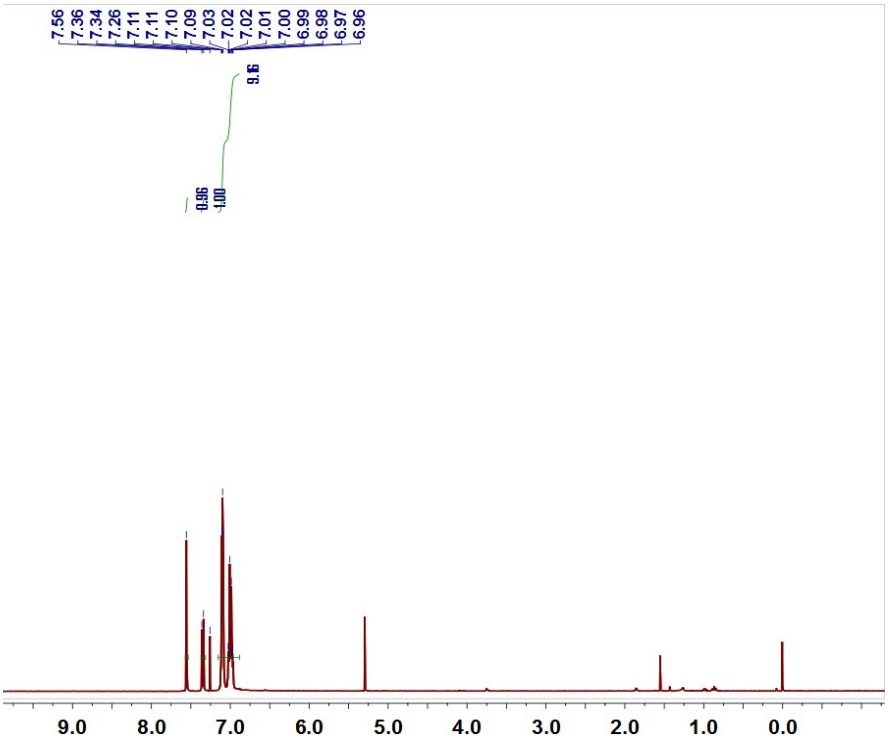

Figure. S7. ^{1}H NMR spectra of compound 2 (400MHz, $CDCl_3$, ppm)

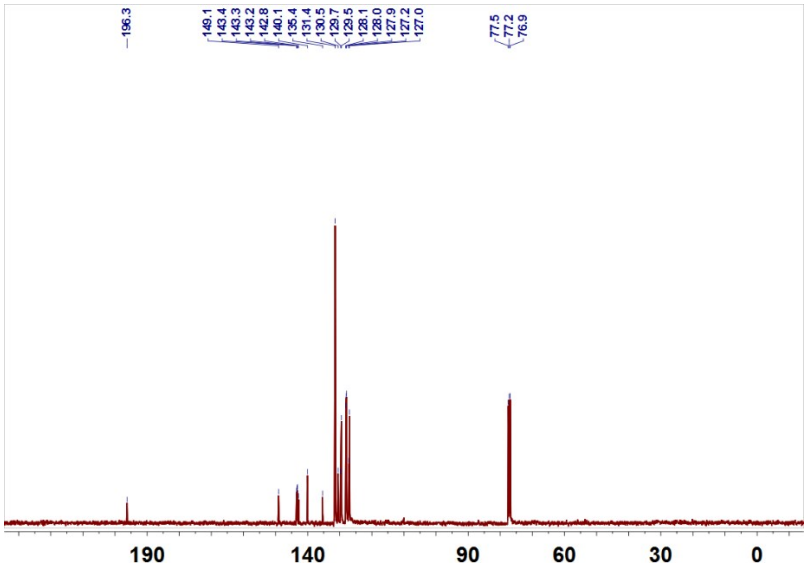

Figure. S8. ^{13}C NMR spectra of compound **2** (100MHz, $CDCl_3$, ppm)

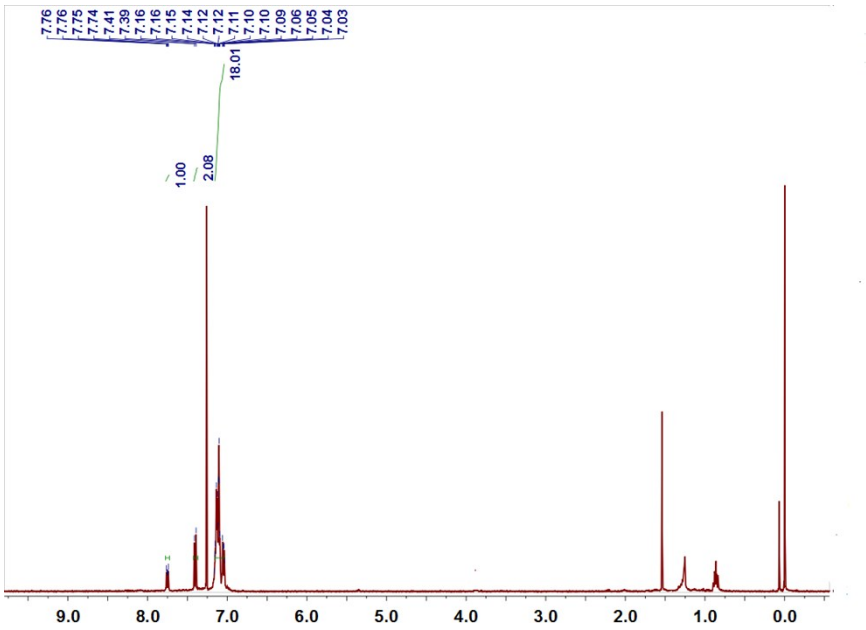

Figure. S9 ^{1}H NMR spectra of compound ITP-TPE (400MHz, $CDCl_3$, ppm)

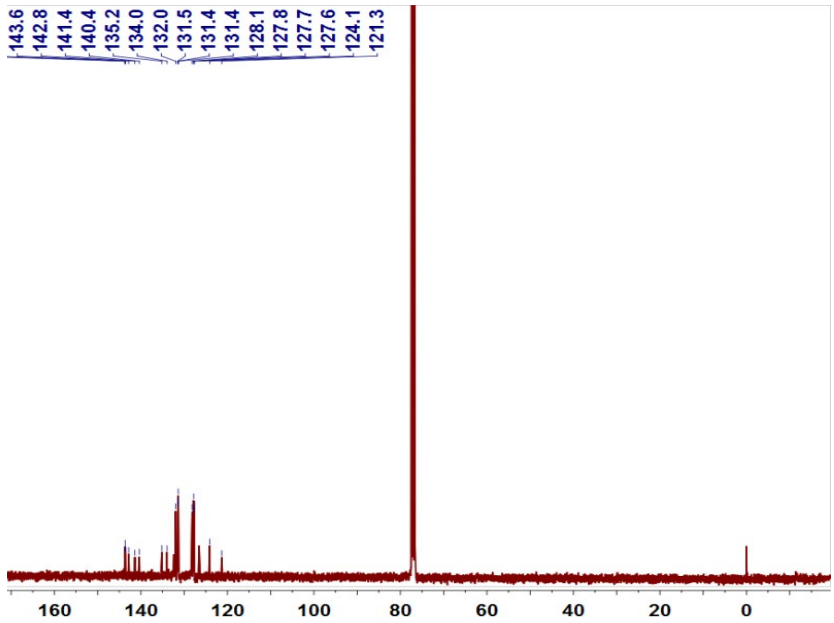

Figure. S10 ^{13}C NMR spectra of compound ITP-TPE (100MHz, $CDCl_3$, ppm)

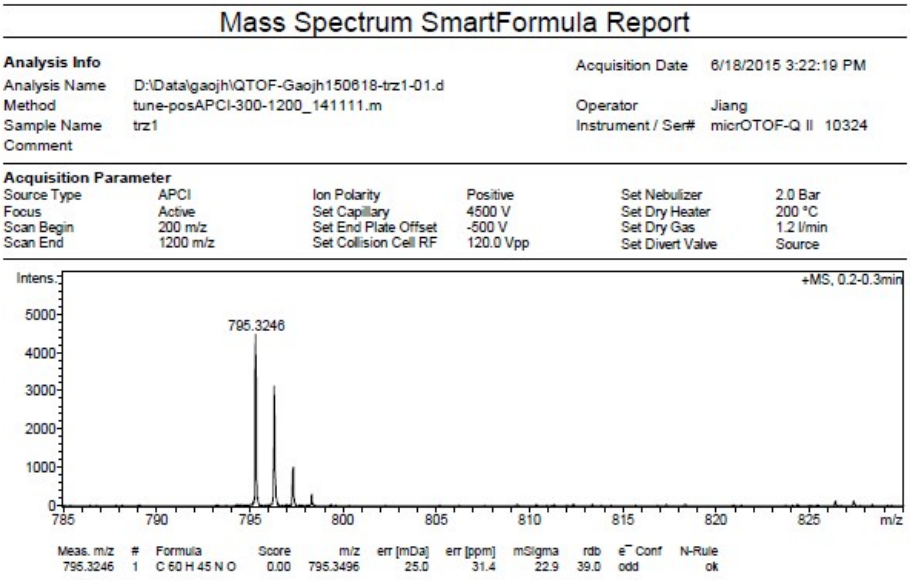

Figure S11. NMRS of **2**

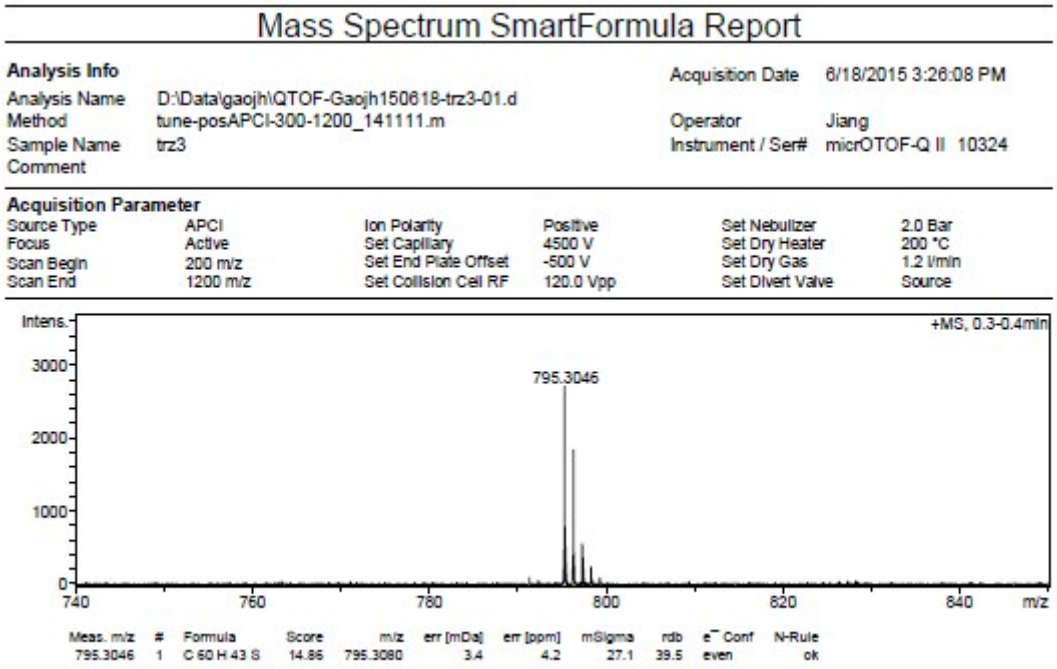

Figure S12. NMRS of ITP-TPE

3 References

S1 (a) V. Thomsen, D. Schatzlein, and D. Mercuro, *Spectroscopy*, 2003, **18**, 112; (b) F. Zheng, F. Zeng, C. Yu, X. Hou and S. Wu, *Chem. Eur.J.*, 2013, **19**, 936; (c) A. Roy, D. Kand, T. Saha, P. Talukdar, *Chem. Commun*., 2014, **50**, 5510.