Electronic Supplementary Material (ESI) for RSC Advances.

A Bis-benzimidazole PMOs Ratiometric Fluorescence Sensor with Integrating of AIEE and ESIPT for Sensitive Detection of Cu^{2+}

Xiafan Hao,[a] Shuhua Han,*[a] Jingtao Zhu,[b] Yongfeng Hu,[c] Lo Yueh Chang,[d] Chih-Wen Pao,[e] Jeng-Lung Chen,[e] Jin-Ming Chen,[e] Shu-Chih Haw[e]

[a] Key Lab of Colloid and Interface Chemistry Ministry of Education, Shandong University, Jinan 250100, P. R. China

[b]MOE Key Laboratory of Advanced Micro-structured Materials, School of Physics Science and Engineering, Tongji University, Shanghai 200092, P. R. China

[c] Canadian Light Source 44 Innovation Boulevard Saskatoon, SK, S7N 2V3, Canada

[d] Institute of Functional Nano & Soft Materials (FUNSOM), Soochow University
Soochow University- Western University Centre for Synchrotron Radiation Research

[e] National Synchrotron Radiation Research Center 101 Hsin-Ann Rd., Science-Based Industrial Park Hsinchu 30076, Taiwan

*To whom correspondence should be addressed: E-mailshuhhan@sdu.edu.cn: Tel: +86-531-88365450; Fax: +86-531-88564464.

PMOs=Periodic mesoporous organosilicas; AIEE=Aggregation-induced emission enhancement; ESIPT=excited-state intramolecular proton transfer.

Supporting information

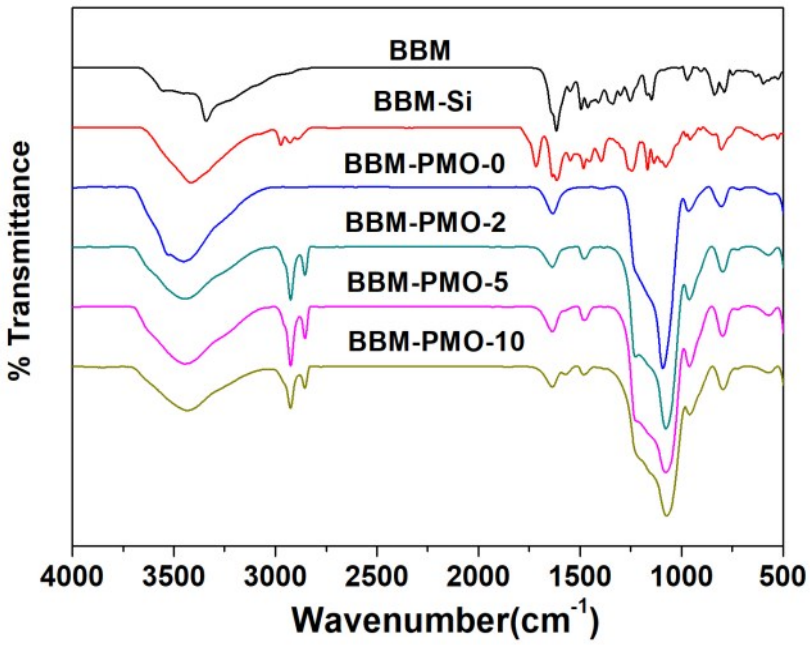

Figure S1. FT-IR spectra of BBM, BBM-Si and BBM-PMO-X after extraction, X=0, 2, 5, 10, respectively. (X is the quality fraction of BBM-Si).

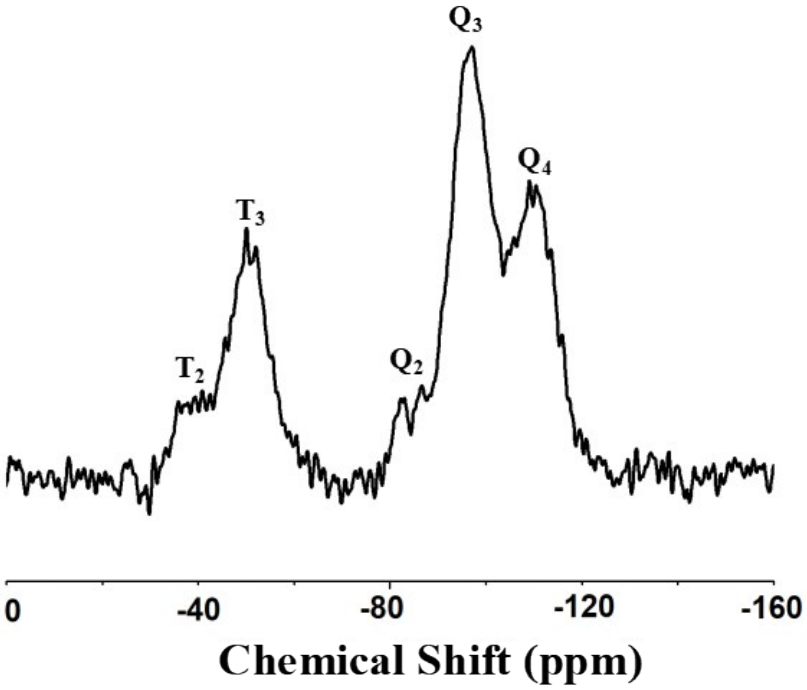

Figure S2. ^{29}Si MAS NMR spectrum of BBM-PMO-20.

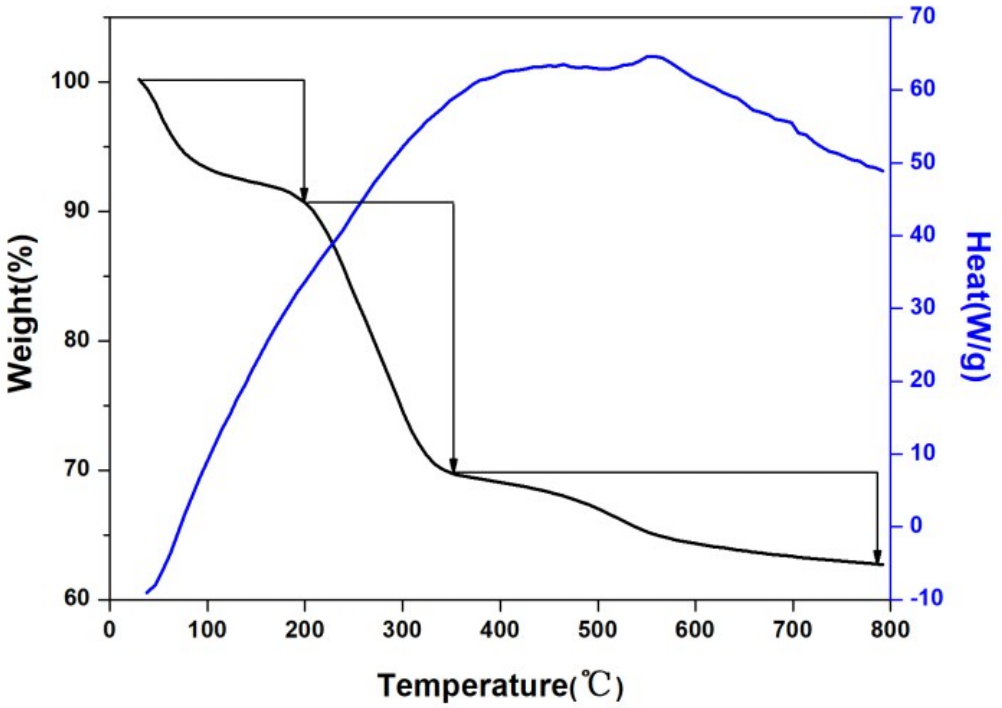

Figure S3. TGA / DSC of BBM-PMO-10.

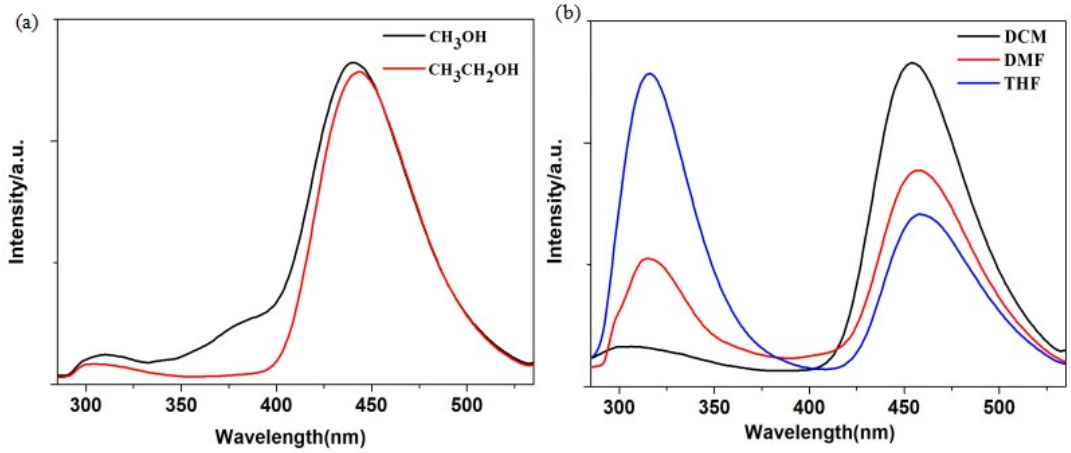

Figure S4. Fluorescence spectra of BBM (10^{-6} M) in different solvents (a) protic solvents (CH_3OH, CH_3CH_2OH); (b) aprotic solvents (DCM, DMF, THF).

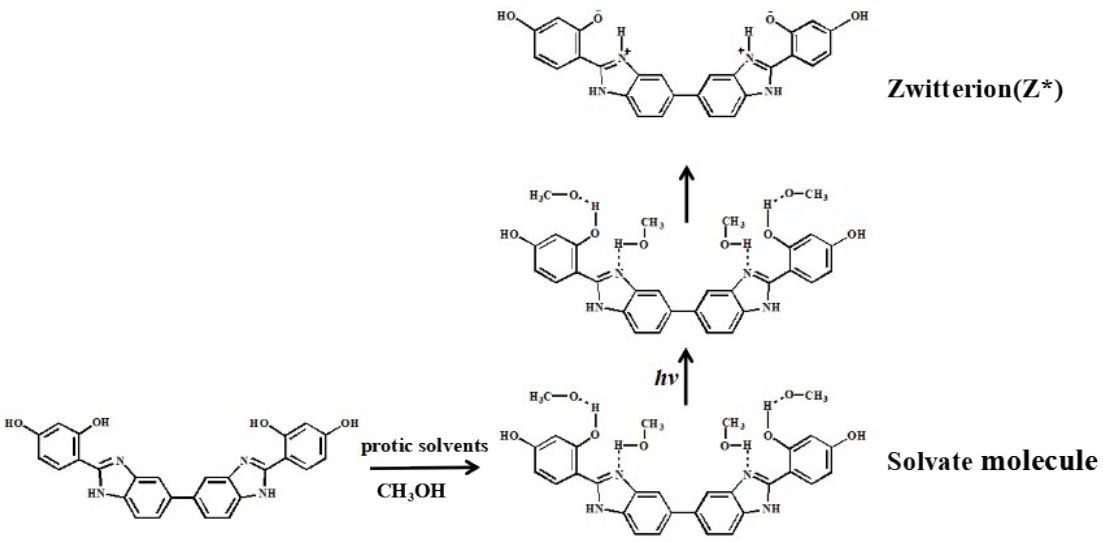

Figure S5. The formation of zwittrion.

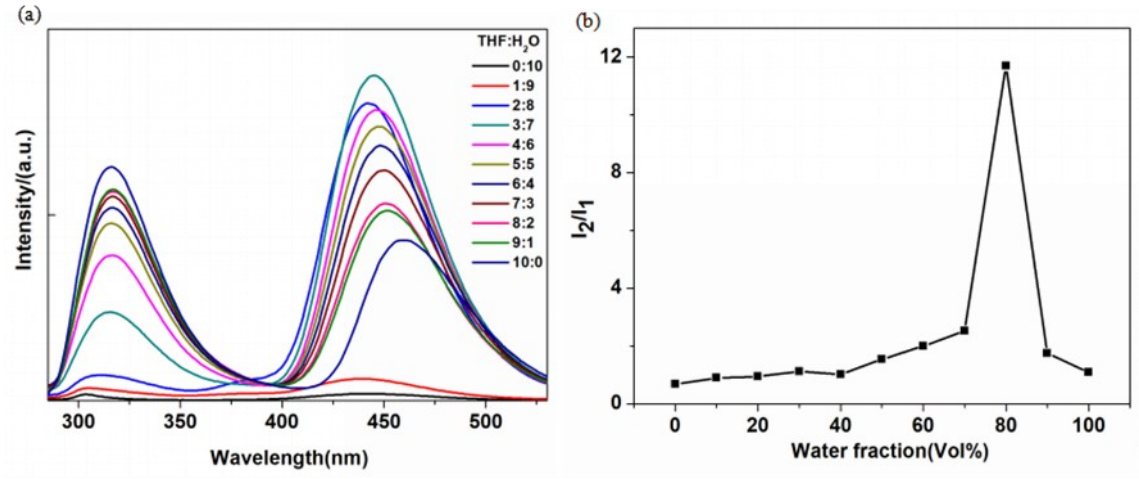

Figure S6. (a) Fluorescence spectra of BBM （10^{-6} M） in different THF/H_2O (v/v); (b) fluorescence intensity ratio I_2/I_1 in THF/H_2O of different water fraction (f_w).

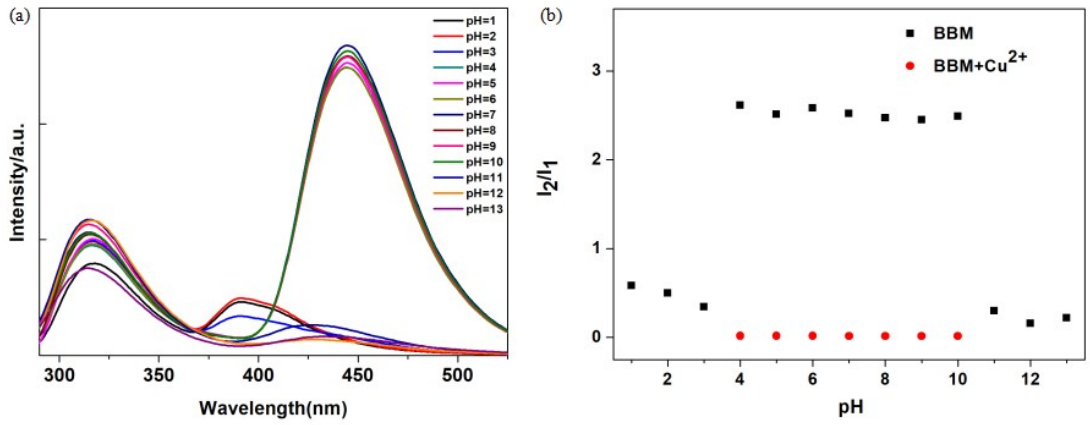

Figure S7. (a) Fluorescence emission spectra of BBM (10^{-6} M) in THF:H_2O=3:7 (v/v) with different pH value; (b) fluorescence intensity ratio I_2/I_1 of BBM (10^{-6} M) in THF:H_2O=3:7 (v/v) in the absence and prescence of Cu^{2+} (10^{-5} M).

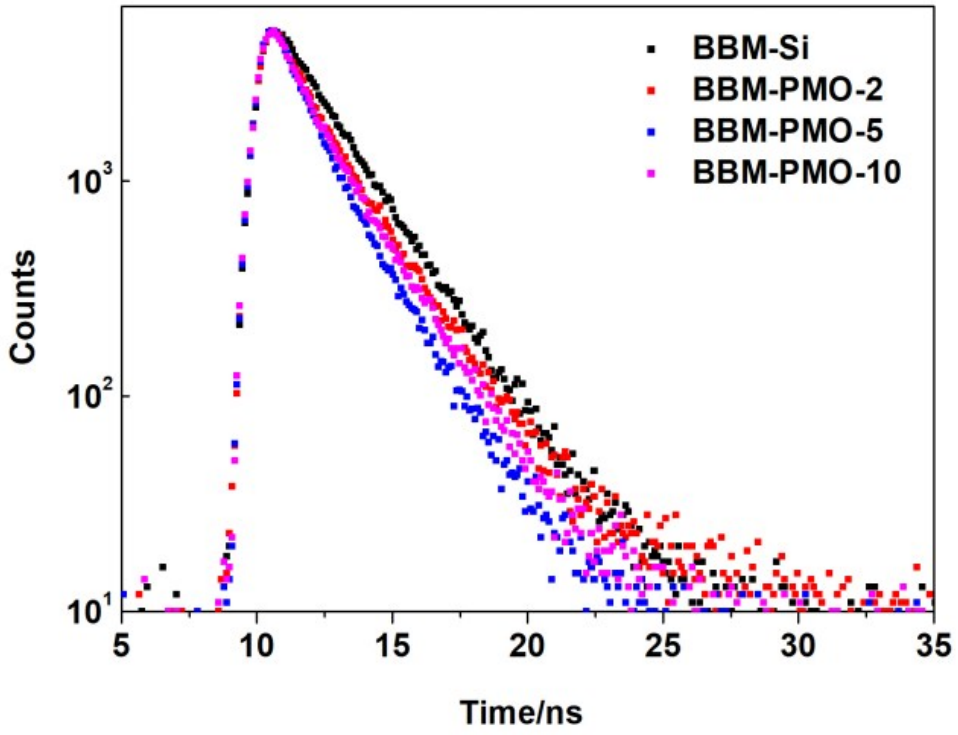

Figure S8. Time-resolved fluorescence for the BBM-Si and BBM-PMO dissolved in THF. The fluorescence signal was collected at 450 nm, the excitation wavelength at 380nm.

Table S1. Fluorescence lifetimes of BBM-Si and BBM-PMOs

	BBM-Si	BBM-PMO-2	BBM-PMO-5	BBM-PMO-10
τ_1/ns	2.07(97%)	1.68(86%)	1.03(47%)	0.73(21%)
τ_2/ns	4.57(3%)	3.83(14%)	2.07(53%)	2.05(79%)
$\bar{\tau}$ /ns	2.15	1.98	1.58	1.77

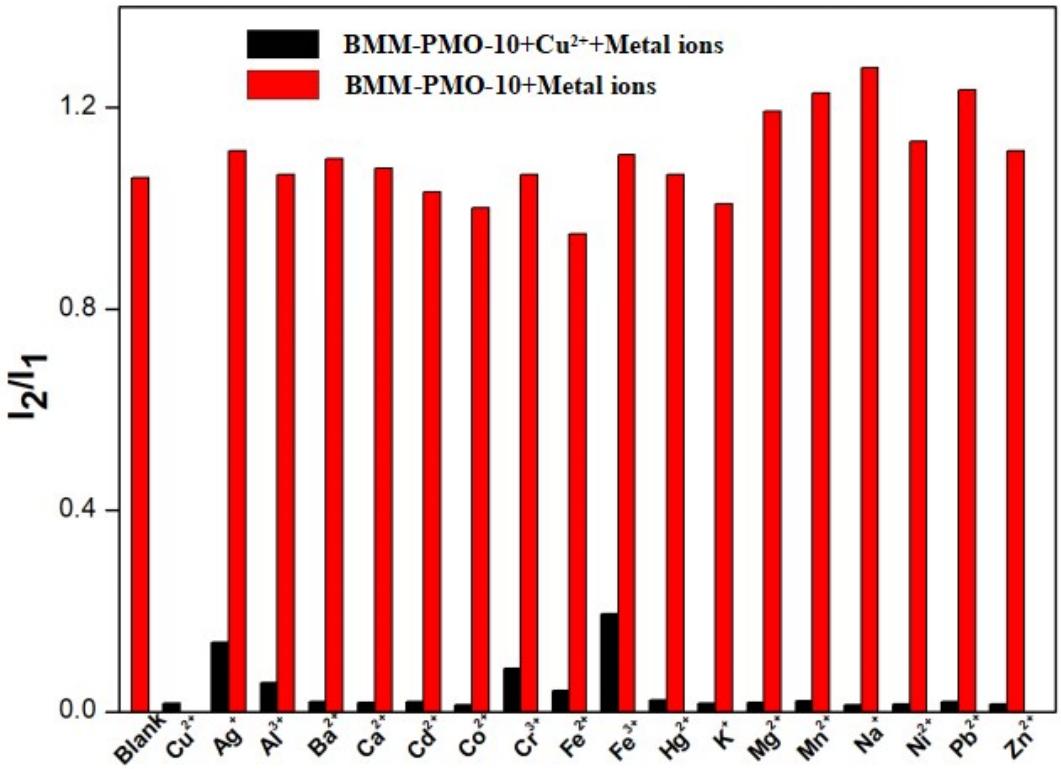

Figure S9. Fluorescence intensity ratio I_2/I_1 of BBM-PMO-10 (5×10^{-6} g/mL) in the presence of a single metal ion (red bar) and in the mixture of Cu^{2+} and other metal ions (black bar).

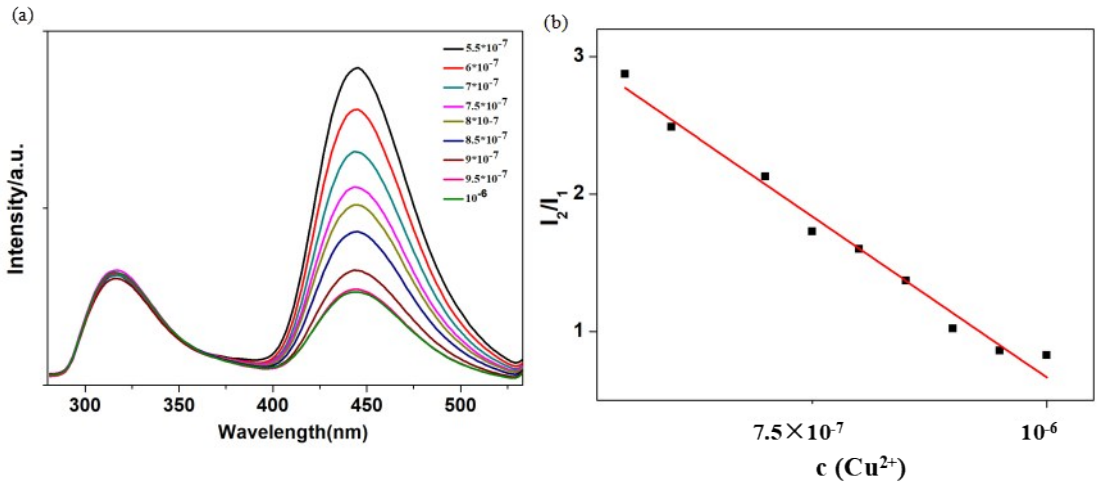

Figure S10. Fluorescence spectra of BBM in THF:H_2O=3:7 (v/v) with different concentration of Cu^{2+} (8×10^{-7} to 8×10^{-6} M); (b) linear relationship between fluorescence intensity ratio I_2/I_1 of BBM (10^{-6} M) and concentration of Cu^{2+} in the solvent.

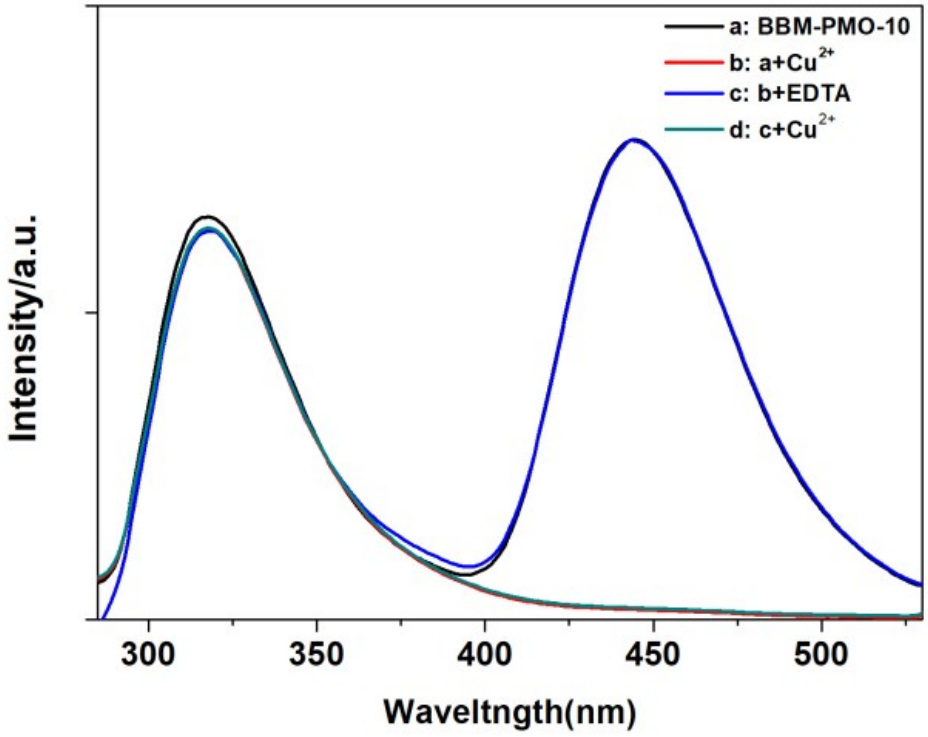

Figure S11. The reproductive test of BBM-PMO-10 (5×10^{-6} g/mL) in THF/H_2O (3:7 v/v).

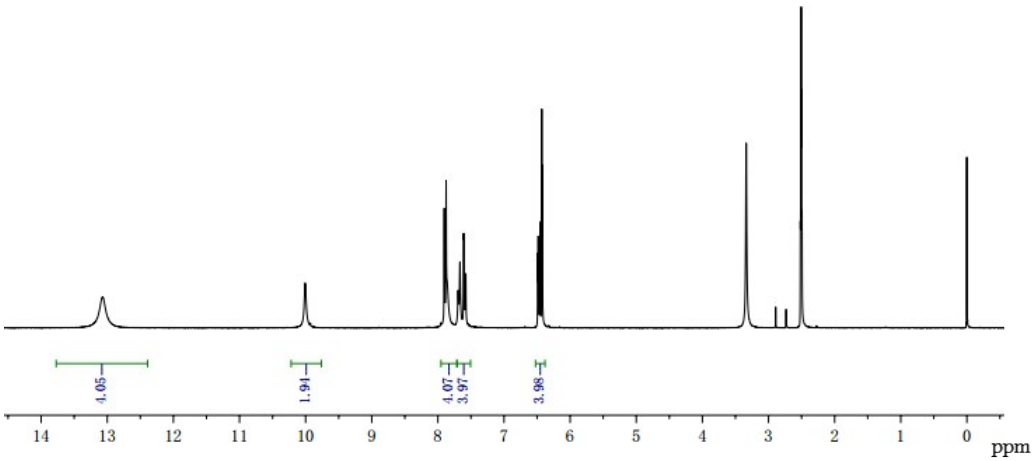

Figure S12. ^{1}H NMR spectrum of BBM

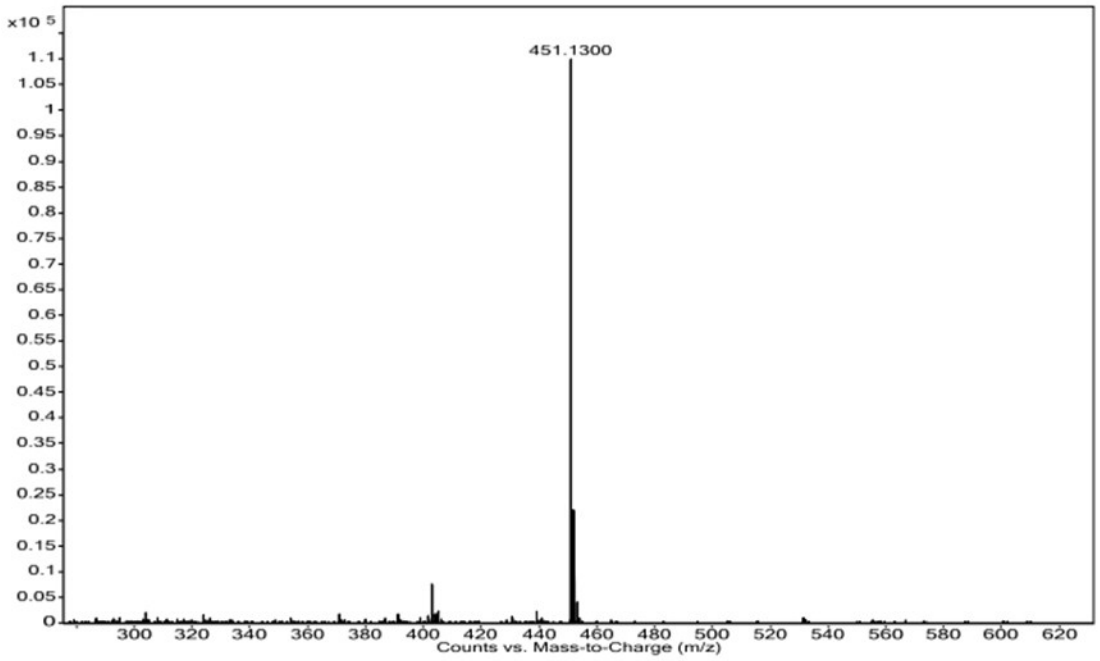

Figure S13. HRMS spectrum of BBM

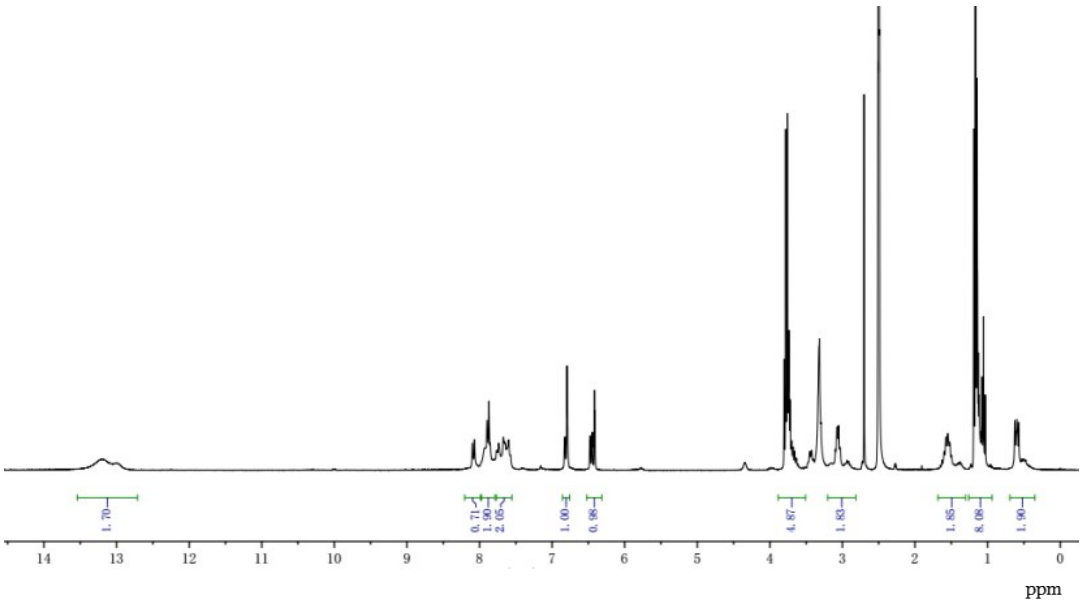

Figure S14. [1]H NMR spectrum of BBM-Si.

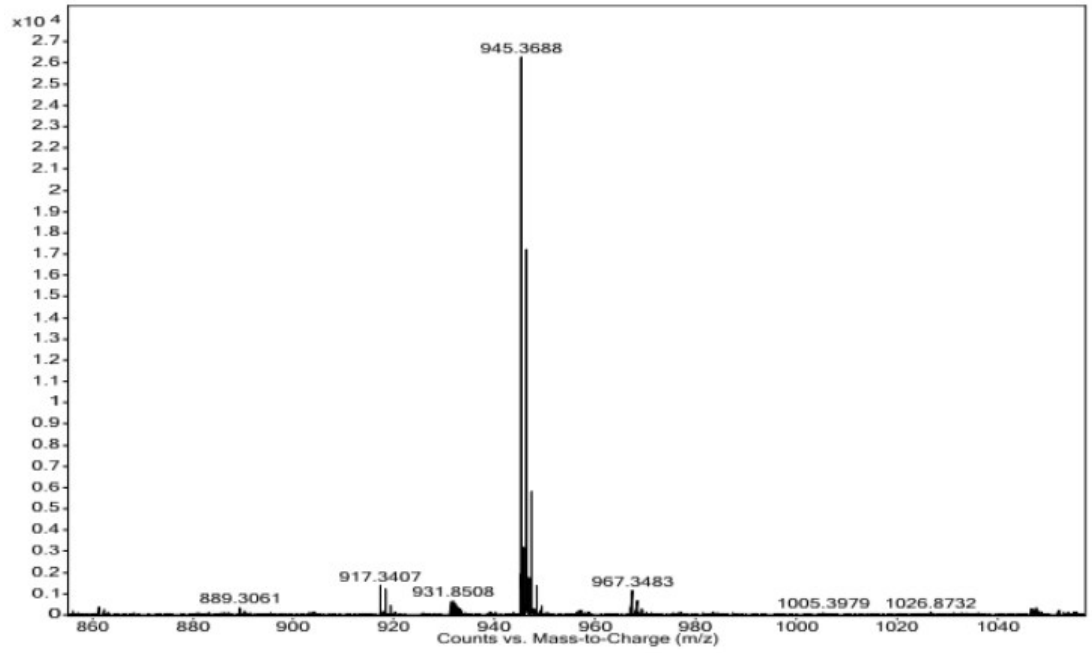

Figure S15. HRMS spectrum of BBM-Si

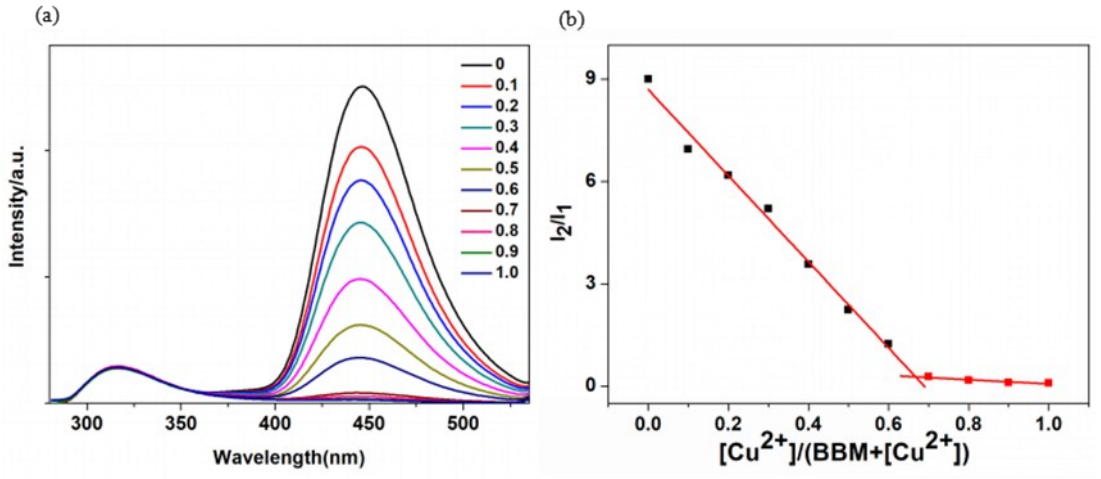

Figure S16 (a) Fluorescence spectra of solutions containing different molar fraction of Cu^{2+}. (b) The Job's plot of I_2/I_1 with molar fraction of Cu^{2+}.