Electronic Supplementary Material (ESI) for Dalton Transactions.
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Supporting information

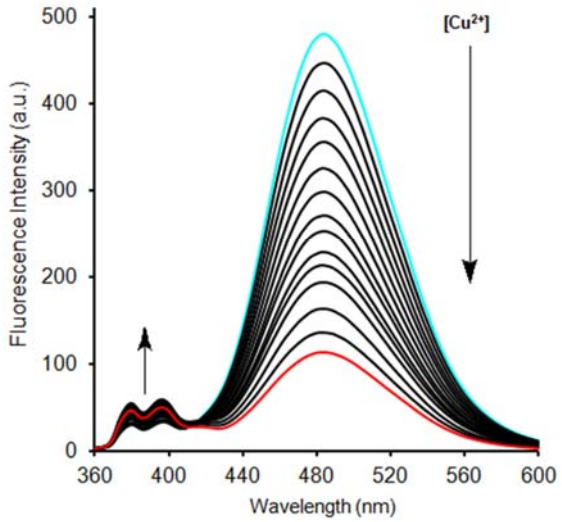

Figure S1. Fluorescence spectral of **L** (1.0 μM) upon addition of increasing concentrations of Cu^{2+} in CH_3CN / H_2O (v/v, 95:5) solution at 298K. λ_{ex} = 343 nm.

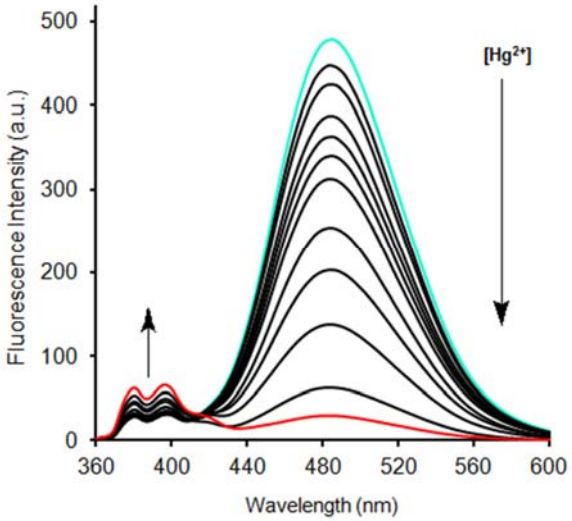

Figure S2. Fluorescence spectral of **L** (1.0 μM) upon addition of increasing concentrations of Hg^{2+} in CH_3CN / H_2O (v/v, 95:5) solution at 298K. λ_{ex} = 343 nm.

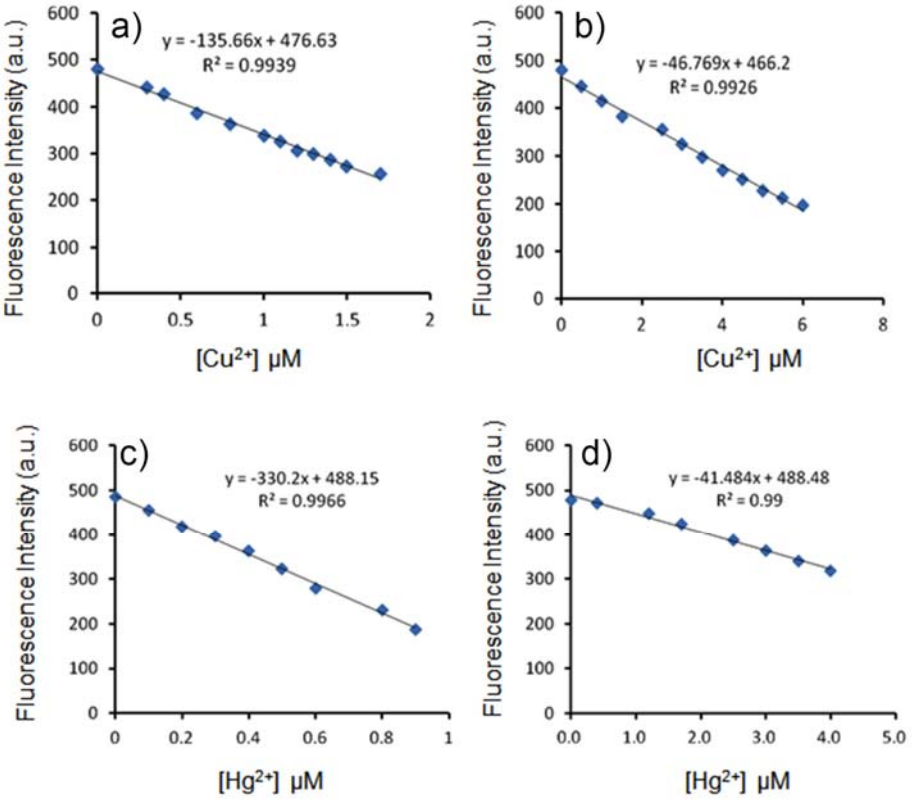

Figure S3. Plot of fluorescence intensity change (485 nm) of **L** with varied concentrations of Cu^{2+} and Hg^{2+} at 298K, the limit of detection of Cu^{2+} was calculated to be a) 4.54×10^{-9} M in CH_3CN, b) 1.87×10^{-8} M in CH_3CN/H_2O (v/v, 95:5), and the limit of detection of Hg^{2+} was calculated to be c) 2.64×10^{-9} M in CH_3CN, d) 1.08×10^{-8} M in CH_3CN/H_2O (v/v, 95:5), by the formula (3σ/K).

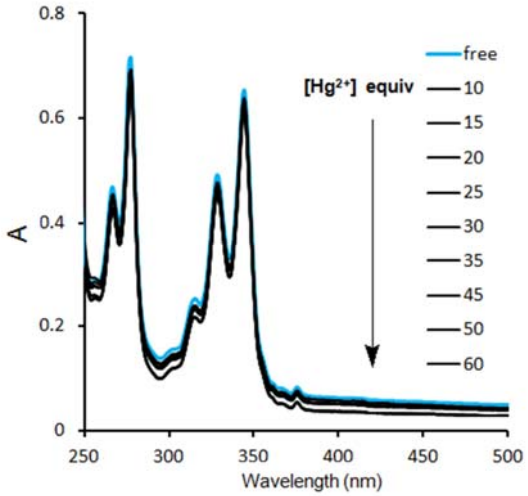

Figure S4. UV-vis spectral changes of **L**(1.0 μM) in CH_3CN / H_2O solution (v/v, 95:5) with increasing concerntration of Hg^{2+} ions.

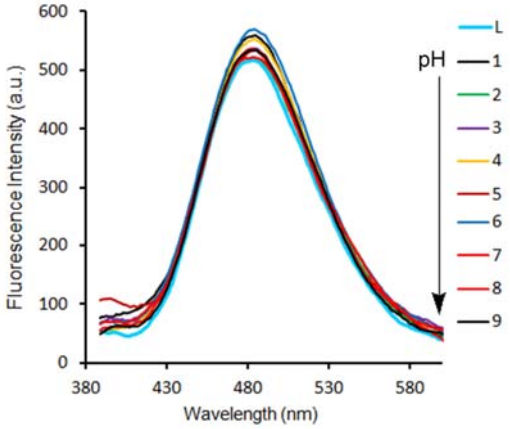

Figure S5. Fluorescence spectral changes of **L** (1.0 μM) in CH_3CN / H_2O (v/v, 95:5) from pH1.0 to 9.0. λ_{ex} = 343 nm.

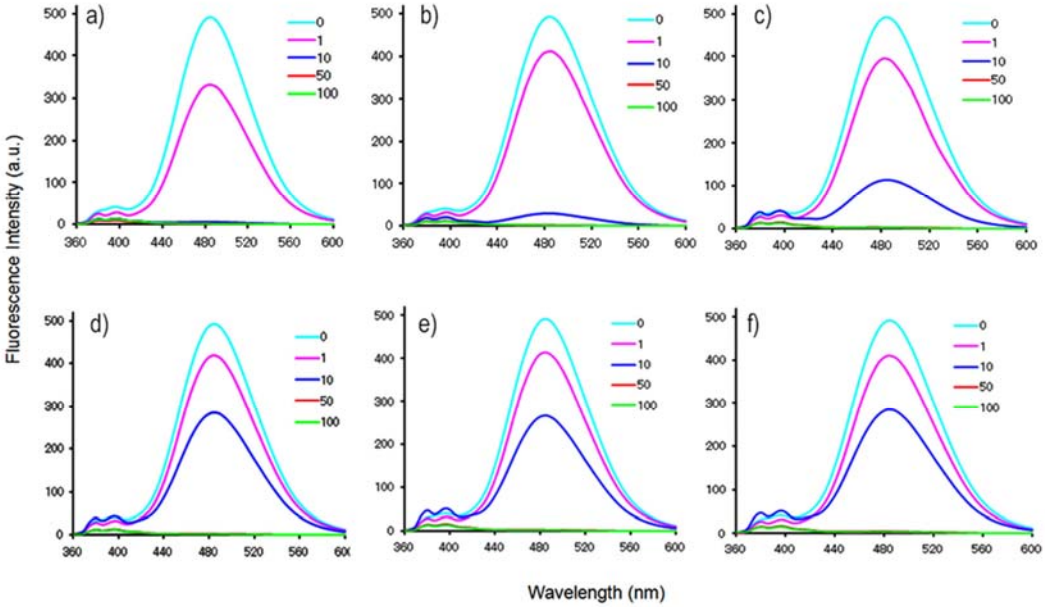

Figure S6. Fluorescence spectral changes of **L** (1.0 μM) upon addition of different concentrations of $Hg(ClO_4)_2$ (1, 10, 50, 100 μM) and determined immediately at 298 K in a) CH_3CN solution; b) 1% H_2O (H_2O/CH_3CN, v/v); c) 2% H_2O (H_2O/CH_3CN, v/v); d) 3% H_2O (H_2O/CH_3CN, v/v); e) 4% H_2O (H_2O/CH_3CN, v/v); f) 5% H_2O (H_2O/CH_3CN, v/v). λ_{ex} = 343 nm.

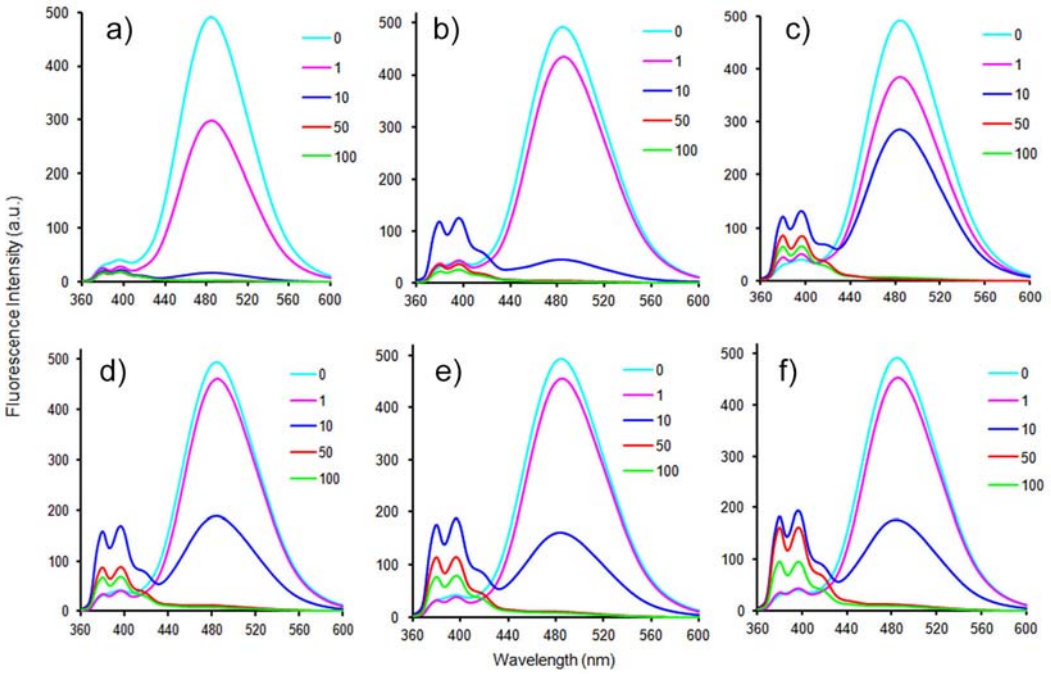

Figure S7. Fluorescence spectral changes of **L** (1.0 μM) upon addition of different concentrations of $Hg(ClO_4)_2$ (1, 10, 50, 100 μM) and determined after 48 h at 298 K in a) CH_3CN solution; b) 1% H_2O (H_2O/CH_3CN, v/v); c) 2% H_2O (H_2O/CH_3CN, v/v); d) 3% H_2O (H_2O/CH_3CN, v/v); e) 4% H_2O (H_2O/CH_3CN, v/v); f) 5% H_2O (H_2O/CH_3CN, v/v). λ_{ex} = 343 nm.

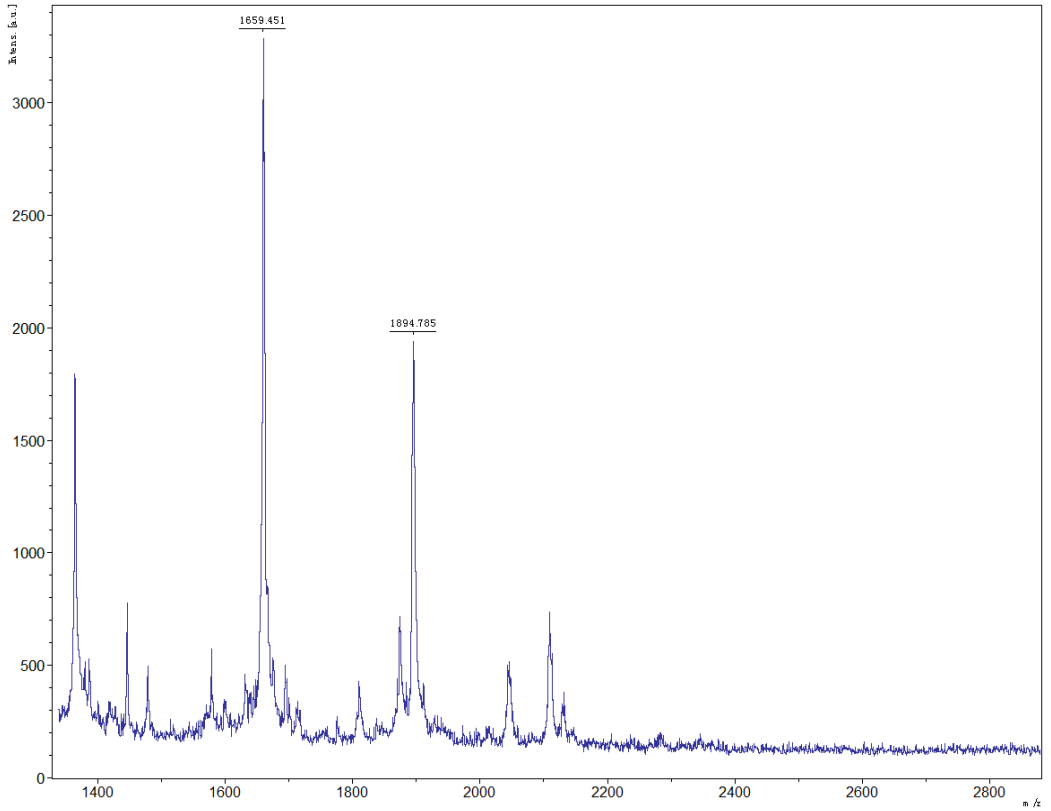

Figure S8. Matrix assisted laser desorption ionization time of flight mass spectrometry (MALDI-TOF) of L: [**L**+ Hg^{2+} + $3H_2O$ + $H]^+$, m/z 1894.785.

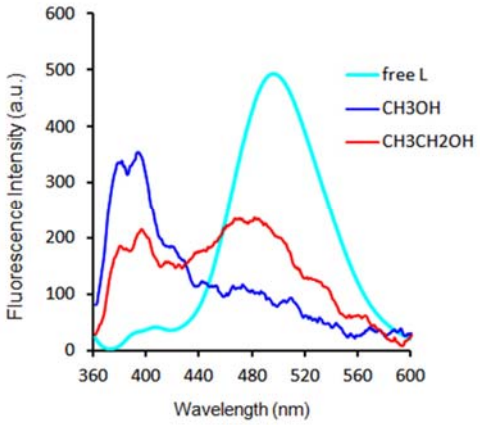

Figure S9. Fluorescence spectral changes of **L**-Hg^{2+} ([**L**]=1.0 μM, [**L**]: [Hg^{2+}]= 1:50) in CH_3CN soluition upon addition 5% of CH_3OH, CH_3CH_2OH, respectively, and determined after 48 h.

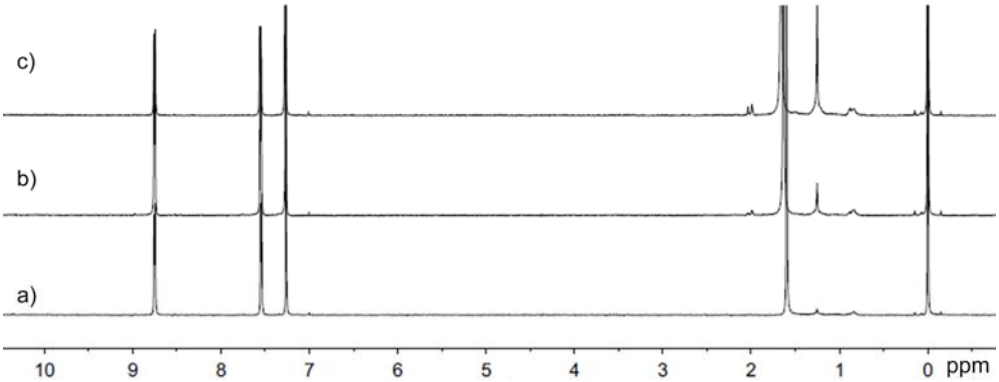

Figure S10. ^1H NMR spectral of 4,4'-bipyridine (3.0 mM) in the presence of different concerntration of $Hg(ClO_4)_2$ a) free 4,4'-bipyridine, b) upon addition of 0.5 equiv of $Hg(ClO_4)_2$, c) upon addition of 1.0 equiv of $Hg(ClO_4)_2$ at 298 K.

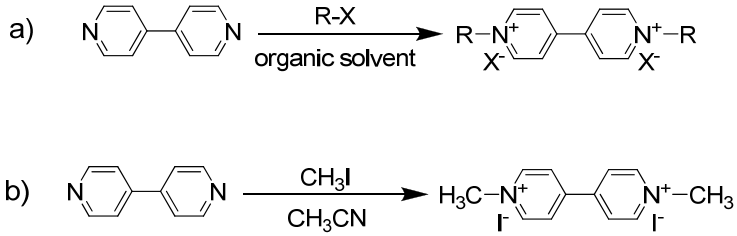

Figure S11. a) General chemical reaction based on 4,4'-bipyridine; b) representative of chemical reaction of 4,4'-bipyridine was selected in the present study.

Detail experiment procedure for reaction (b): CH_3I (284 mg, 2 mmol) was added to a 10 mL CH_3CN solution of 4,4'-bipyridine (156 mg, 1 mmol) and heated under 35 ^oC. During the reaction procedure, the reaction mixture was drawing 3 μL by a syringe to 3 mL of **L**-Hg^{2+} solution (1.0 μM of **L** with 50 equiv of Hg^{2+} in CH_3CN solution) in a cuvette after 1h, 2h, 3h, respectively, and then determined by fluorescence spectral immediately. The increasing monomer emission intensity of **L**-Hg^{2+} decreased with the reaction time increasing, which indicated that 4,4'-bipyridine was consumed dramatically after 3 h later (Figure S12).

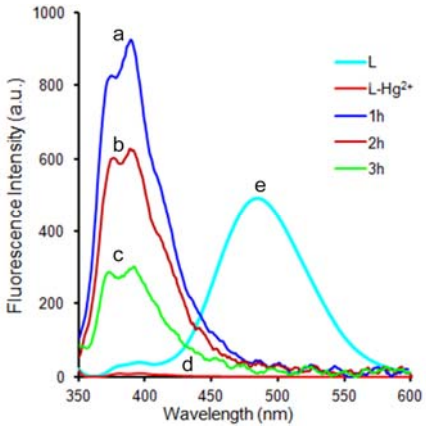

Figure S12. Fluorescence spectral changes of **L**-Hg^{2+} (1.0 μM of **L** with 50 equiv of Hg^{2+} in CH_3CN solution) upon addition of the reaction mixture of 4,4'-bipyridine after a) 1h; b) 2h; c) 3h. at 298 K. λ_{ex} = 343 nm.

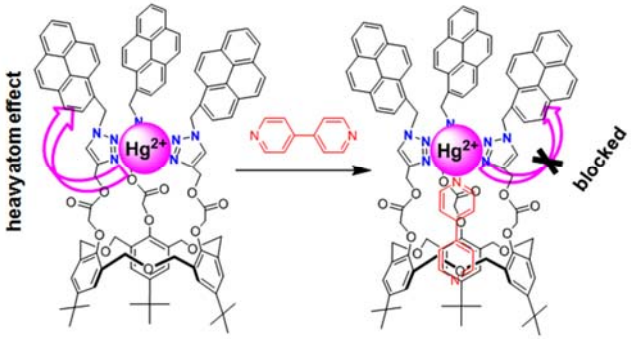

Figure S13. Plausible mechanism of heavy atom effect blocked by 4,4'-bipyridine in **L**-Hg^{2+} complex.

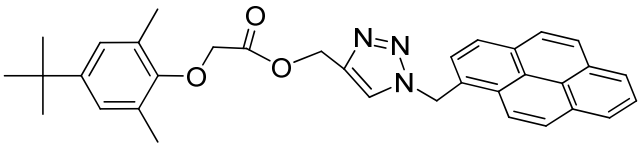

Figure S14. Molecular structure of **M.**

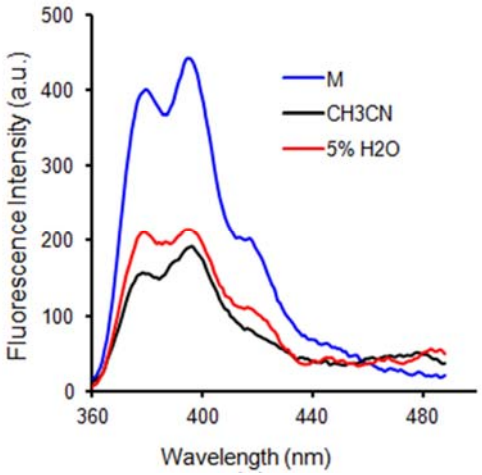

Figure S15. Fluorescence spectral changes of **M** (1.0 μM) upon addition of 50 equiv. of $Hg(ClO_4)_2$ in CH_3CN and H_2O/CH_3CN (v/v, 5:95) solution, respectively at 298K, and determined immediately at 298 K. λ_{ex} = 343 nm.

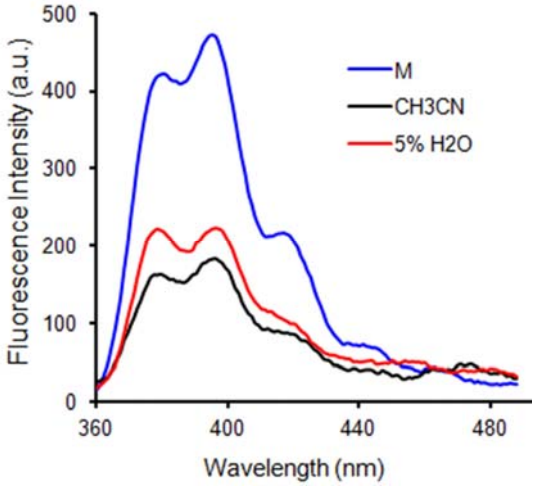

Figure S16. Fluorescence spectral changes of **M** (1.0 μM) upon addition of 50 equiv. of $Hg(ClO_4)_2$ in CH_3CN and H_2O/CH_3CN (v/v, 5:95) solution, respectively at 298K, and determined after 48 h at 298 K. λ_{ex} = 343 nm.

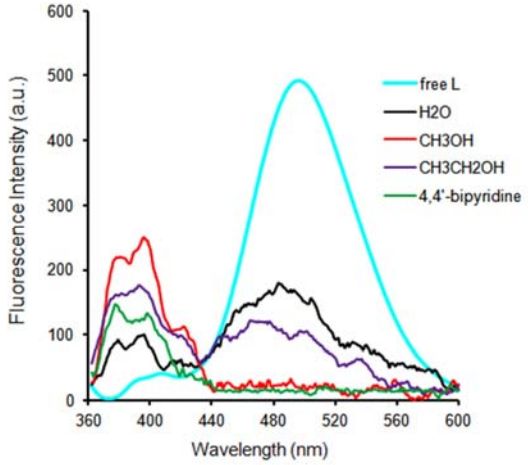

Figure S17. Fluorescence spectral changes of **L**-Cu^{2+} ([**L**]=1.0 μM, [**L**]: [Cu^{2+}]= 1:50) in CH_3CN soluition upon addition 5% of H_2O, CH_3OH, CH_3CH_2OH and 20 equiv of 4,4'-bipyridine, respectively, and then determined after 48 h.