Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

An easy-to-synthesize multi-photoresponse smart sensor for fast detecting Zn2+ and quantifying Fe3+ based on the enol/keto binding mode

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Content

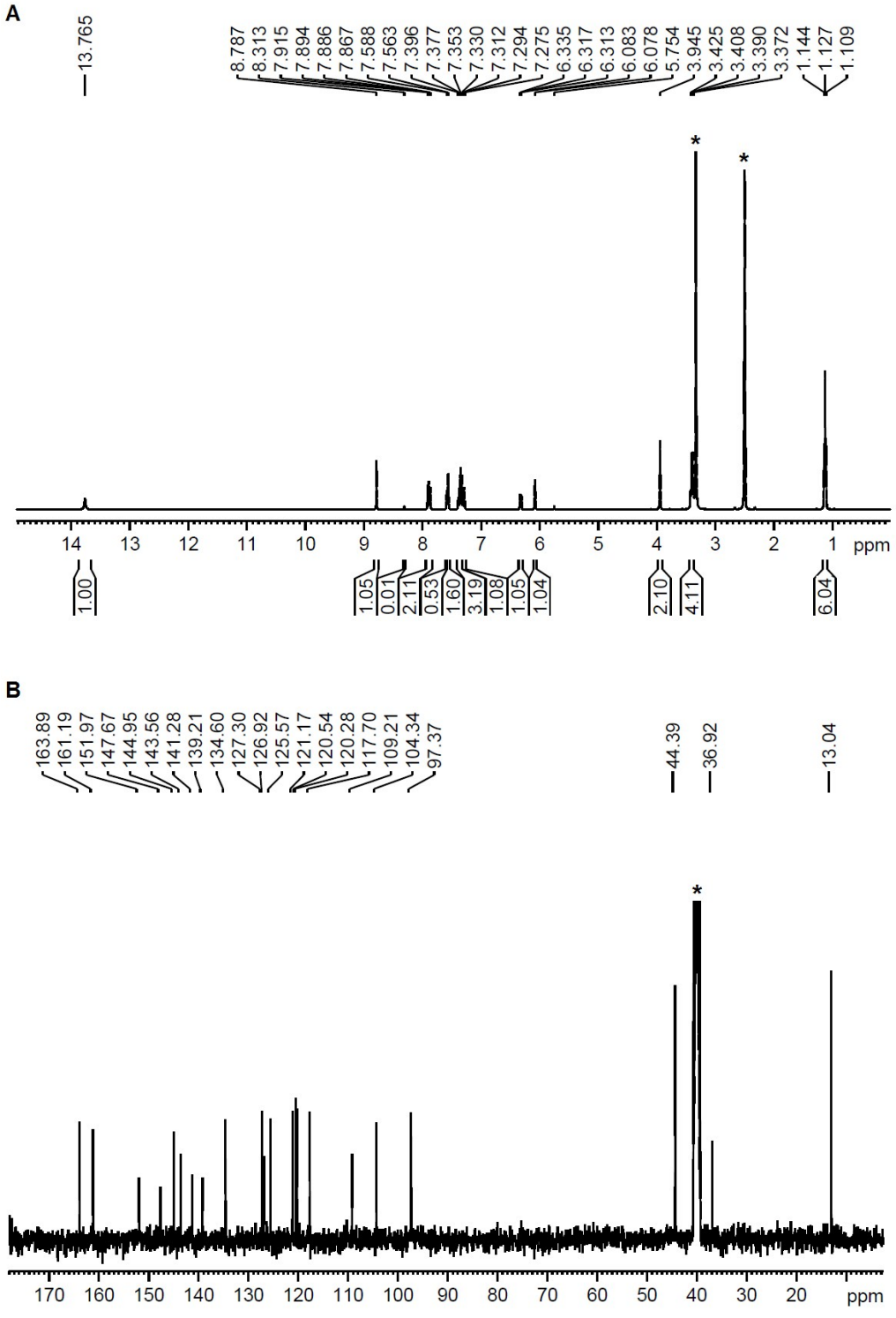

Figure S1 ^{1}H NMR (A) and ^{13}C NMR spectra (B) of EASA-F in DMSO. * indicates the residual solvent signals.

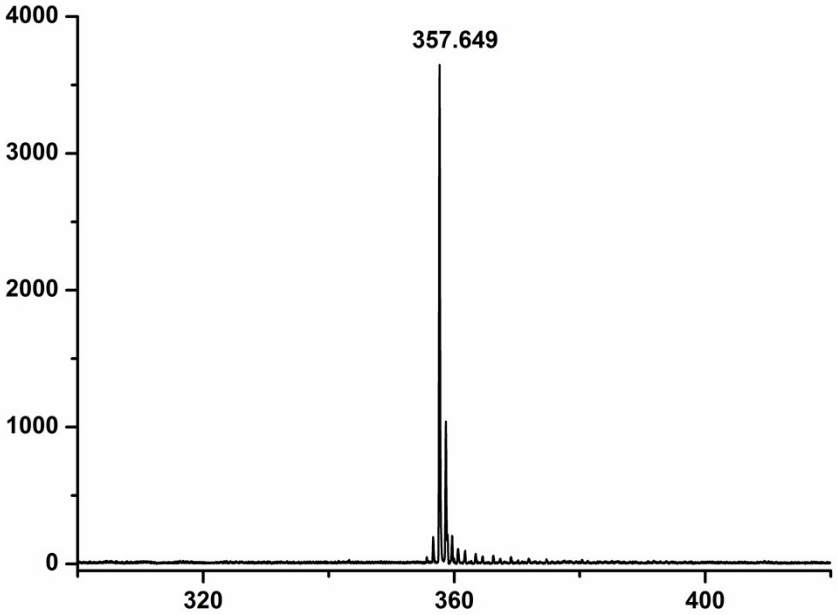

Figure S2 The mass spectroscopy of EASA-F.

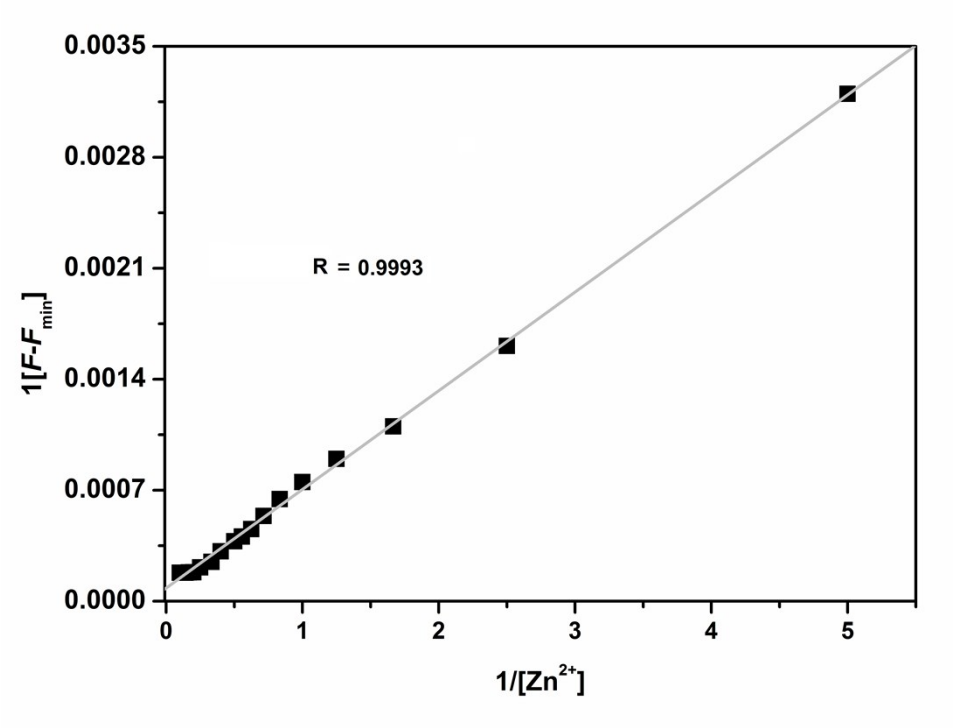

Figure S3 Fluorescence Benesi-Hildebrand plot of $1/(F\text{-}F_{min})$ against $1/[Zn^{2+}]$. F_{min} and F represent the fluorescence emission of EASA-F (10 μM) in the absence and the presence of Zn^{2+} at 500 nm，respectively.

Based on 1:1 stoichiometry, the Benesi-Hildebrand equation can be used to evaluate the binding strength:

$$\frac{1}{F - F_{min}} = \frac{1}{K_a \cdot (F_{max} - F_{min}) \cdot [Zn^{2+}]} + \frac{1}{F_{max} - F_{min}}$$

F_{max} is the fluorescence intensity obtained with a large excess of Zn^{2+}, K is the association constant of Zn^{2+} complex of EASA-F. From the Benesi-Hildebrand analysis, the K is determined to be 6.7×10^4.

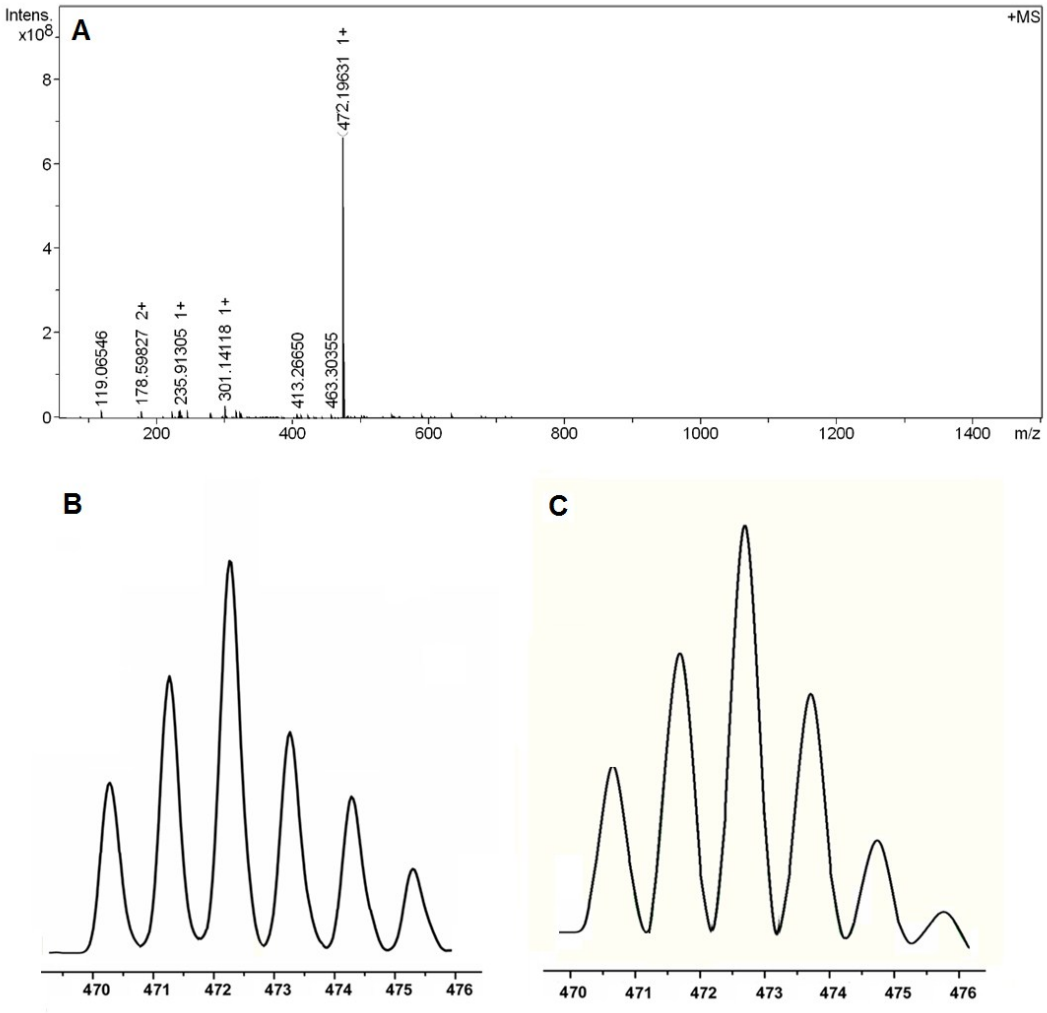

Figure S4 (A and B) Experimental and (C) simulated isotopic pattern for molecular ion of EASA-F upon addition of Zn^{2+}, respectively.

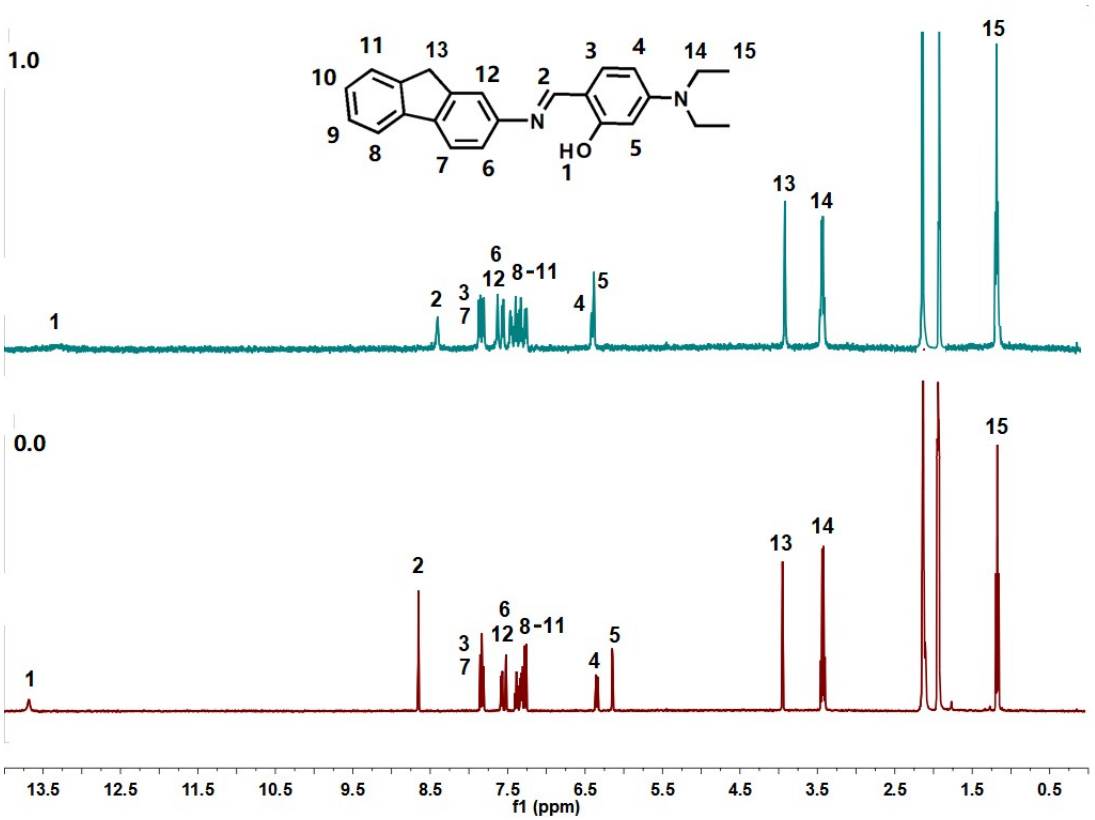

Figure S5 The ^{1}H NMR spectra of EASA-F in the absence and the presence of Zn^{2+} (1.0 equiv.) in CD_3CN, respectively.

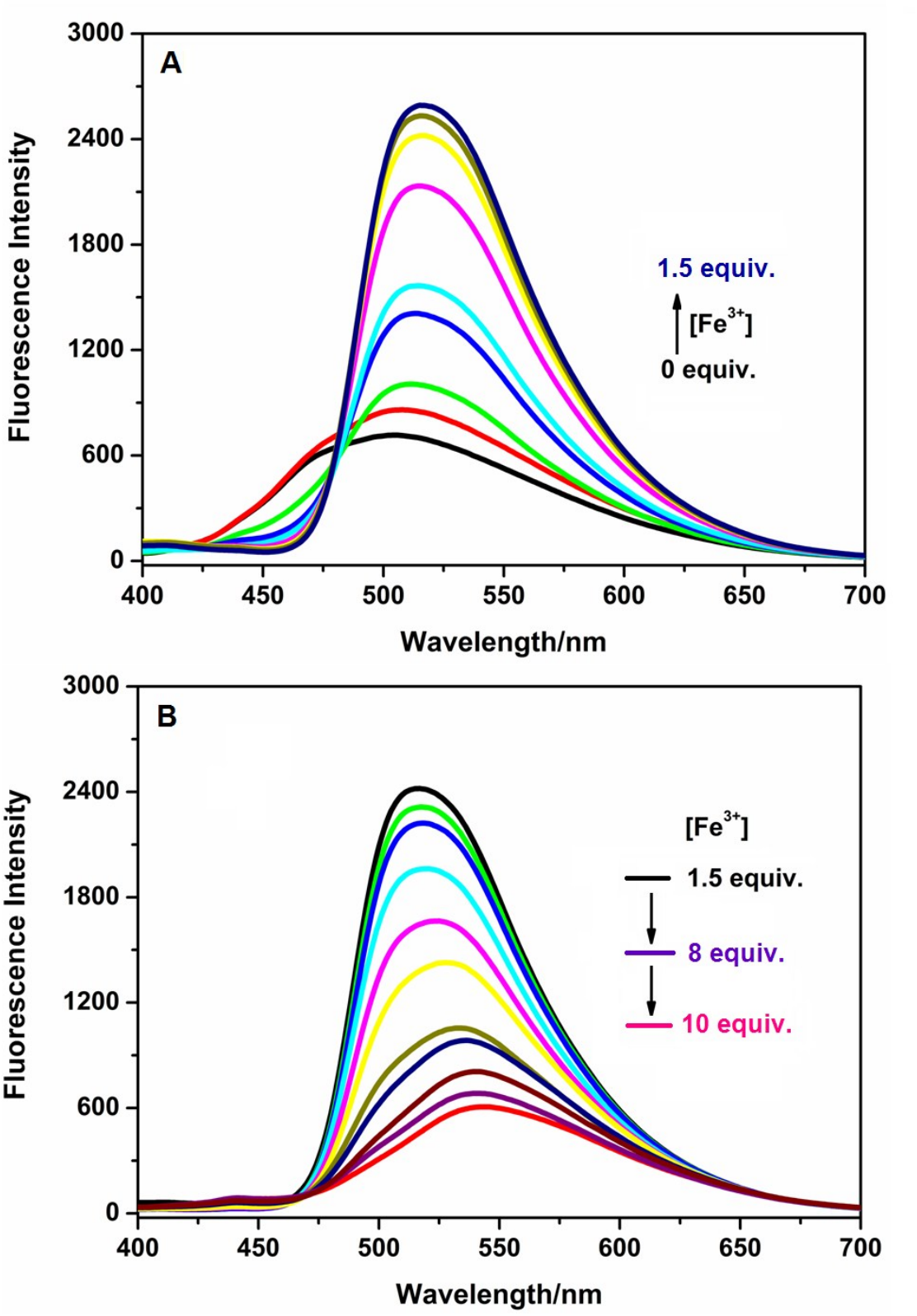

Figure S6 The fluorescence emission spectra of EASA-F upon increasing Fe^{3+} amount from 0 to 1.5 and from 1.5 to 8 even 10 equiv, respectively.

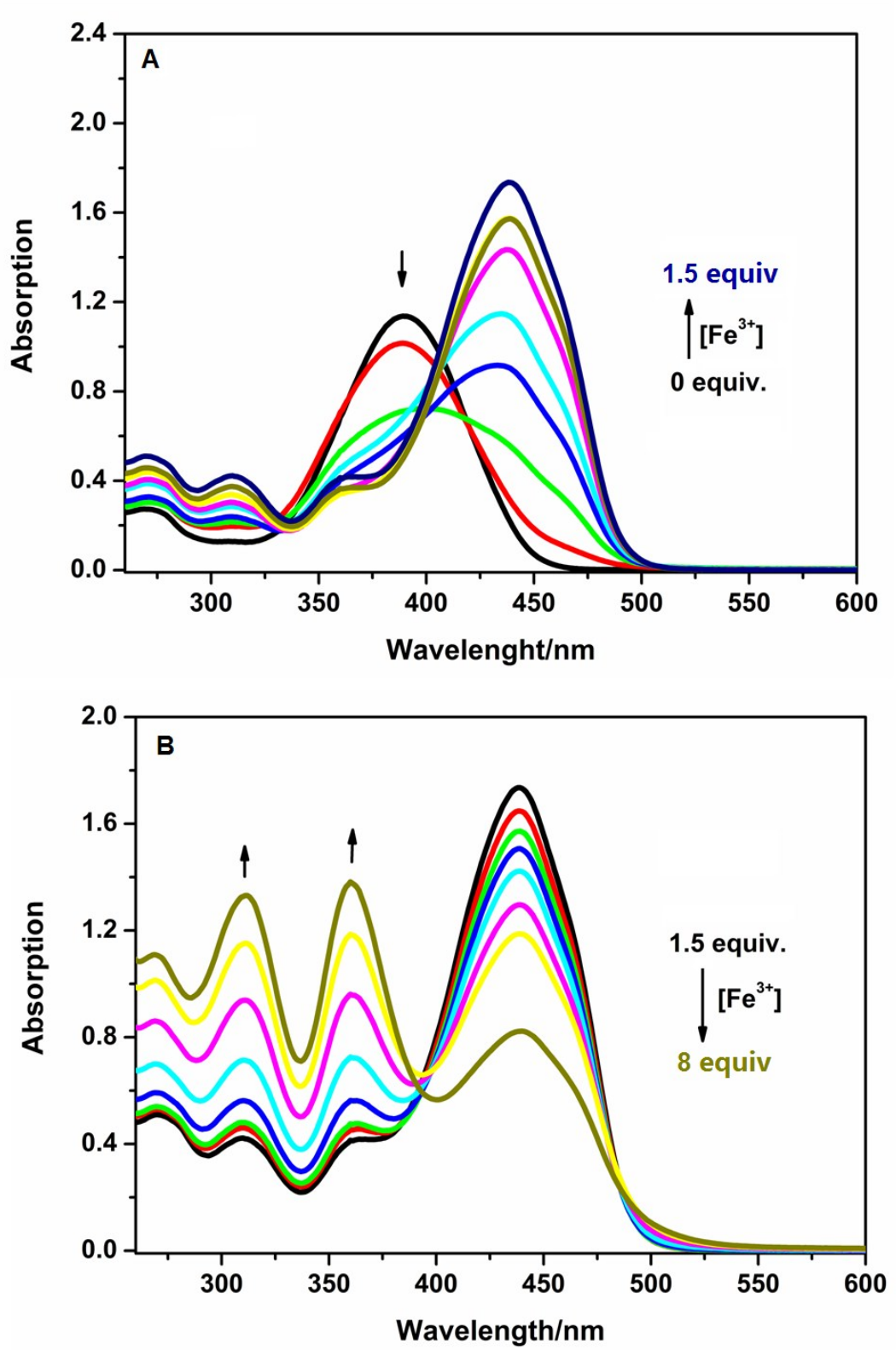

Figure S7 The absorption spectra of EASA-F upon increasing Fe^{3+} amount from 0 to 1.5 and from 1.5 to 8 equiv, respectively.

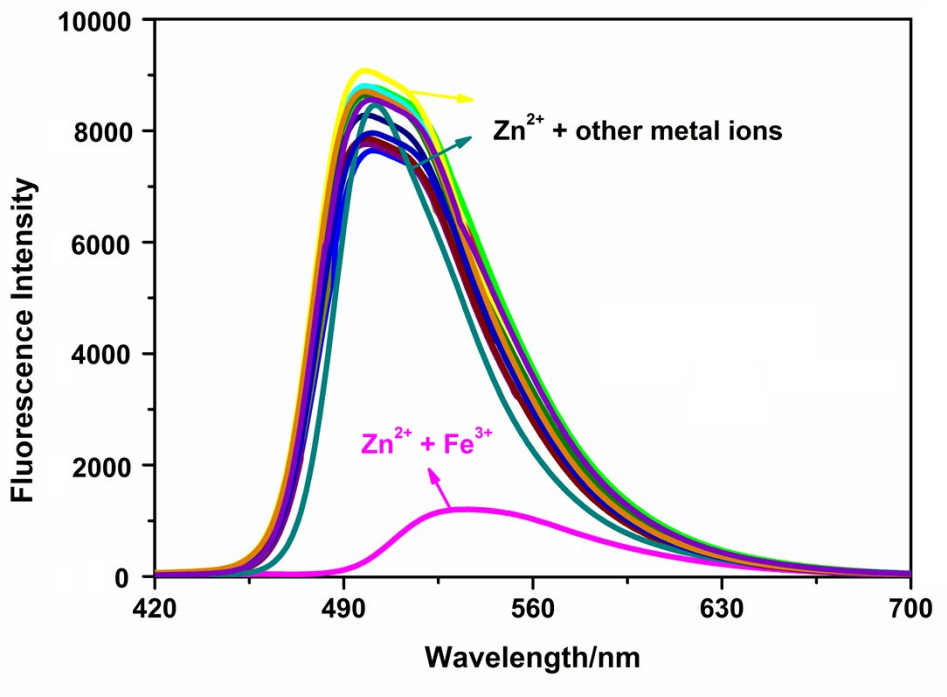

Figure S8 The fluorescence emission spectra of EASA-F-Zn^{2+} system in CH_3CN/H_2O (19:1) upon respective addition of other metal ions such as Pb^{2+}, Mg^{2+}, Co^{2+}, Fe^{3+}, Hg^{2+}, Mn^{2+}, Zn^{2+}, Ni^{2+}, Cd^{2+}, Ca^{2+}, Ba^{2+}, Li^{+}, Na^{+}, K^{+}, Fe^{2+}, Al^{3+}, or Cr^{3+} (10 equiv), respectively.

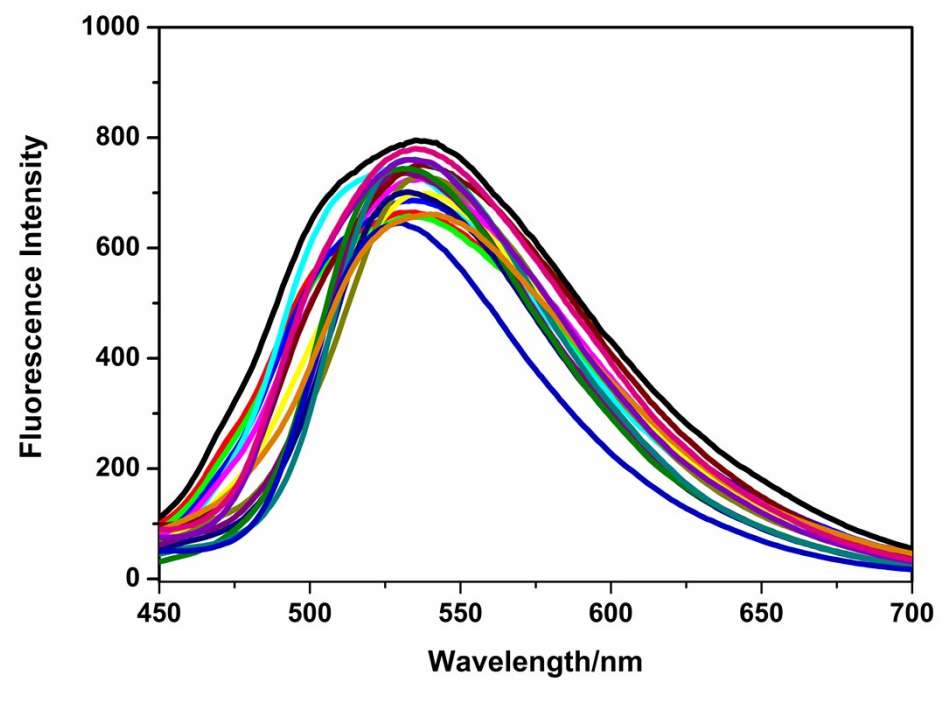

Figure S9 The fluorescence emission spectra of EASA-F-Fe^{3+} system in CH_3CN/H_2O (19:1) upon respective addition of other metal ion such as Li^+, Na^+, K^+, Ca^{2+}, Ba^{2+}, Mg^{2+}, Pb^{2+}, Co^{2+}, Hg^{2+}, Mn^{2+}, Cu^{2+}, Ni^{2+}, Cd^{2+}, Fe^{2+}, Al^{3+}, or Cr^{3+} (10 equiv), respectively.

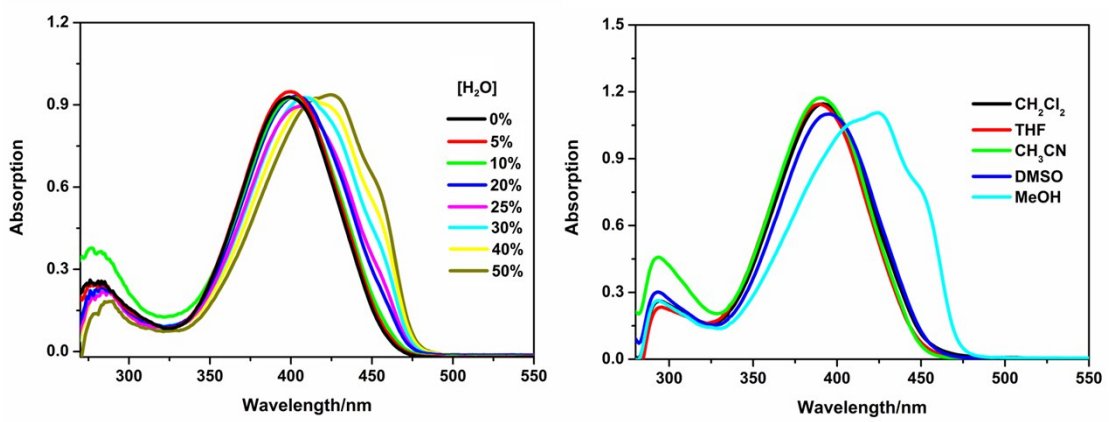

Figure S10 The electronic absorption spectra of EASA-F (20 μM) in DMSO/H_2O mixture with H_2O fractions (f_w) from 0 to 50% (A) and in different solvent including CH_2Cl_2, THF, CH_3CN, DMSO and MeOH (B), respectively.

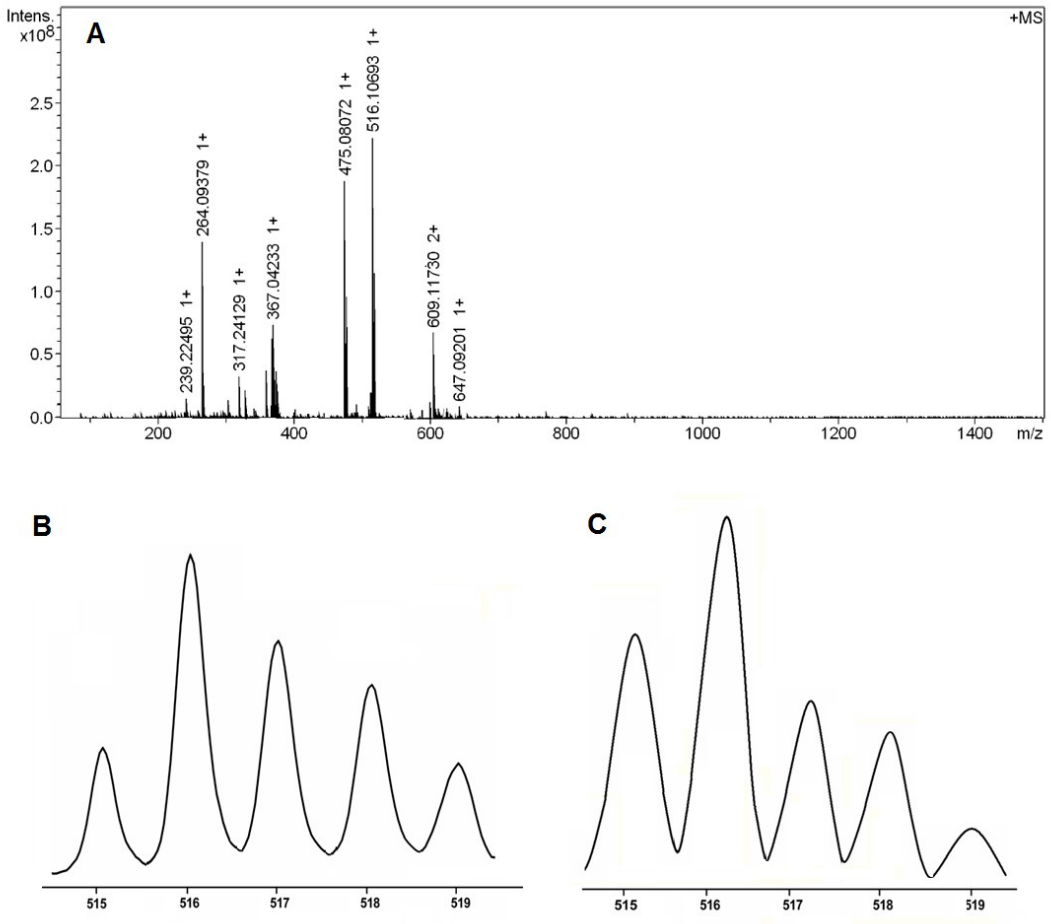

Figure S11 The experimental (A and B) and simulated (C) isotopic pattern for molecular ion of EASA-F upon addition of Fe^{3+} (10 equiv.) in CH_3CN/H_2O (19:1), respectively.

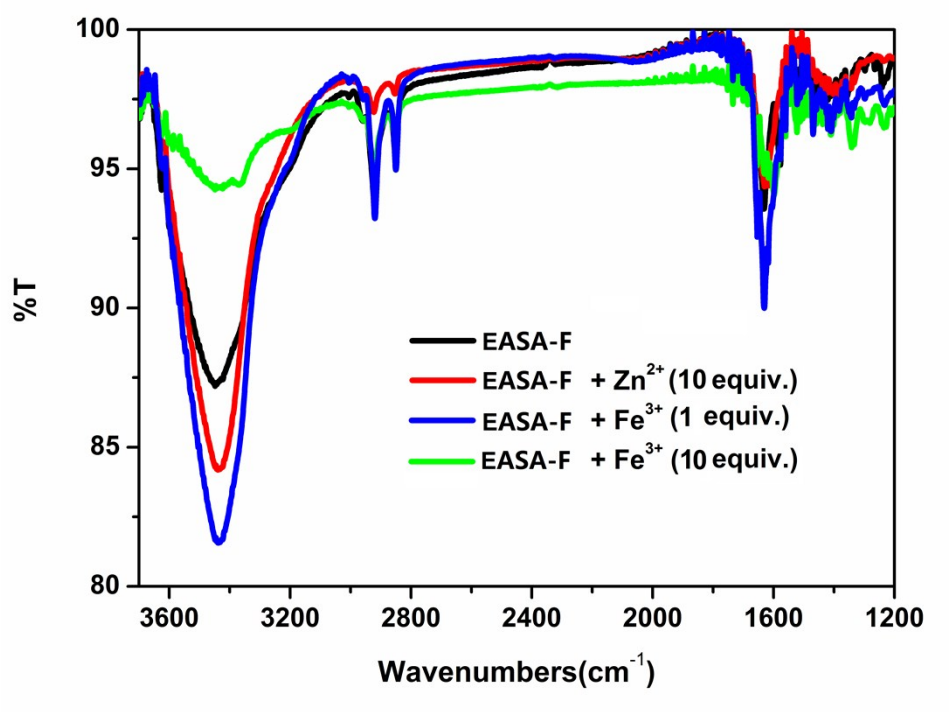

Figure S12 The IR spectra for EASA-F upon respective addition of Zn^{2+} (10 eqiuv.) and Fe^{3+} (1 and 10 eqiuv.), respectively.

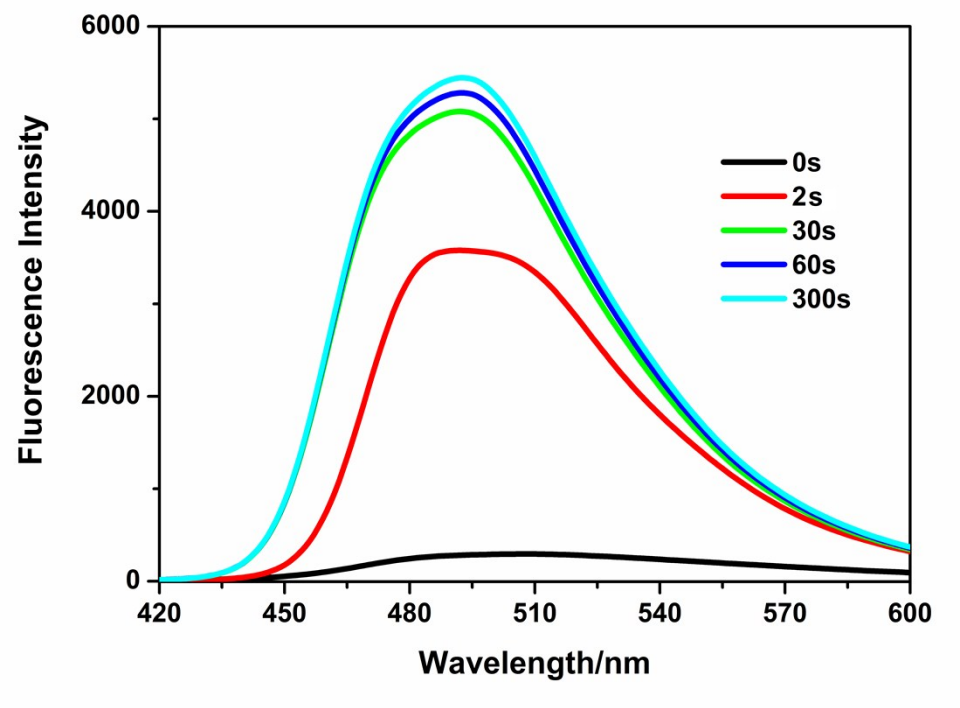

Figure S13 The fluorescence emission of EASA-F along with the changing time upon addition of 10 equiv. Zn^{2+} in CH_3CN/H_2O (19:1).

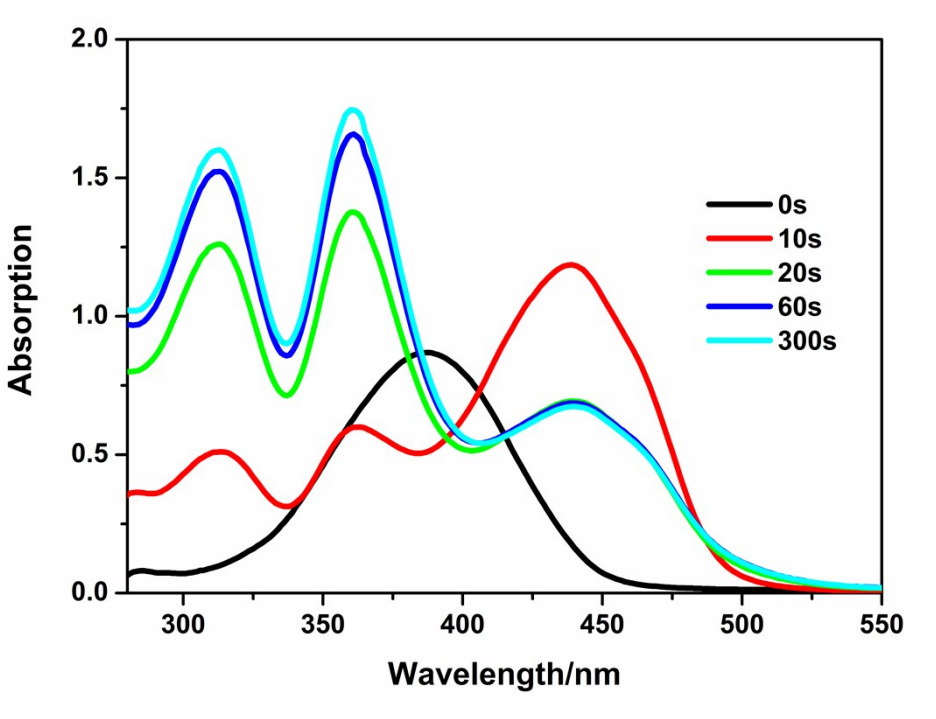

Figure S14 The electronic absorption spectra of EASA-F along with the change in time upon addition of Fe^{3+} (10 equiv.) in CH_3CN/H_2O (19:1).