Electronic Supplementary Information

A Highly Selective Fluorescence Sensor for Tin (Sn^{4+}) and Its Application in Imaging Live Cells

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1. Change in color and fluorescence of 1 with different ions.

Fig. S1 Photos of color changes and fluorescent responses of **1** (20 μM) upon addition of 100 μM different metal ions (Na^+, K^+, Mg^{2+}, Sn^{4+}, Ca^{2+}, Li^+, Fe^{2+}, Ni^{2+}, Cu^{2+}, Cd^{2+}, Ni^{2+}, Ag^+, Mn^{2+}, Cr^{3+}, Hg^{2+}, Zn^{2+}, Pb^{2+}) in ethanol/Hepes buffer solutions (2:1, v/v, pH 7.2) (λ_{ex} = 365 nm).

2. Limit of detection.

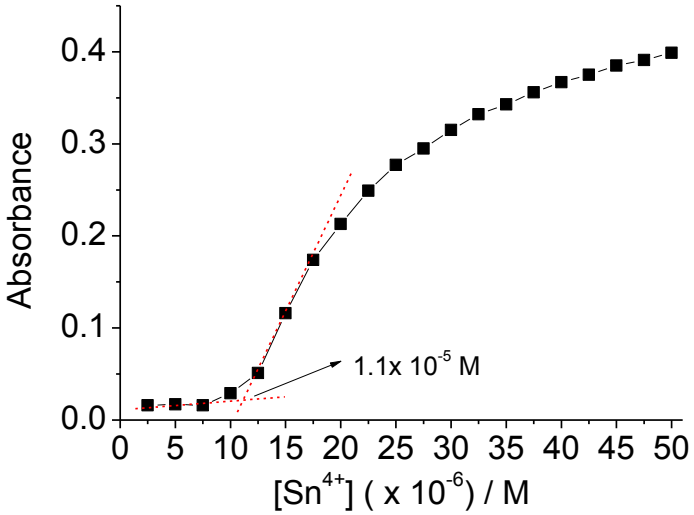

Fig. S2 The absorbance at 555 nm of **1** (2.0×10^{-5} M in ethanol/Hepes (2:1, v/v, pH 7.2)) as a function of Sn^{4+} concentration.

3. Fluorescence titration curve

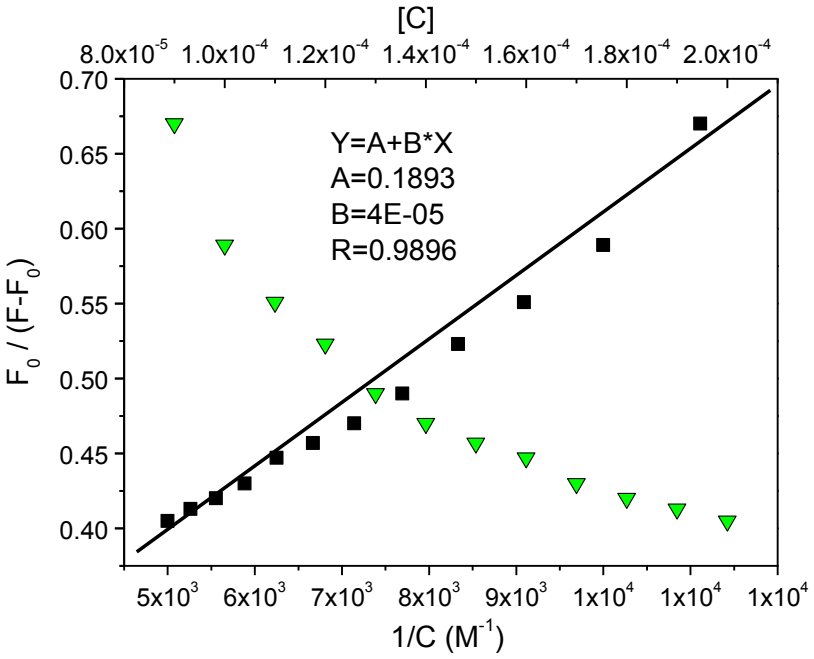

Fig. S3 Fluorescence intensity ratio $F_0/(F-F_0)$ at 580 nm of **1** *vs* **1**/[Sn^{4+}] (■) and **1** *vs* [Sn^{4+}] (▼) ($C_{\mathbf{1}}$ = 20 μM, λ_{ex} = 420 nm). Time interval between two adjacent measurements was 5 min.

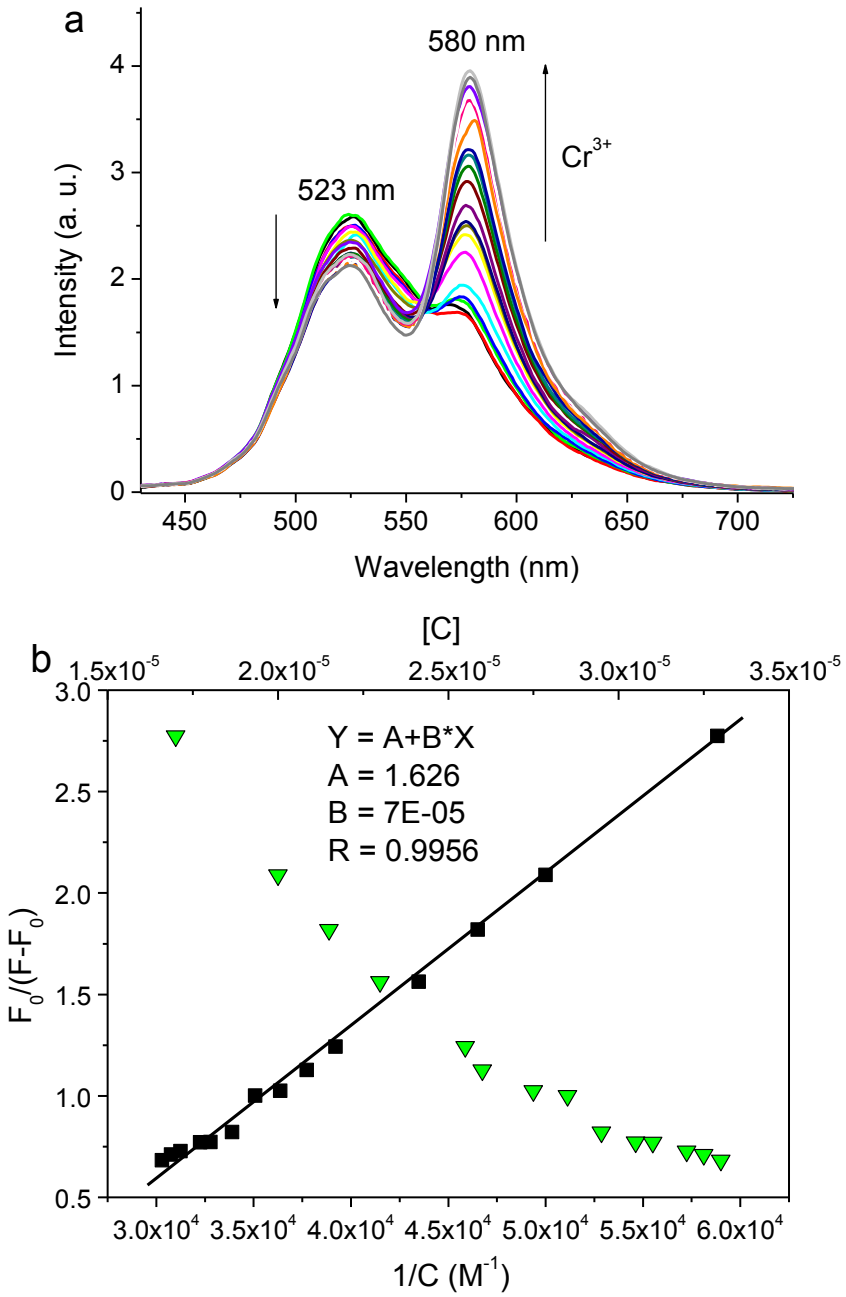

Fig. S4 a) Fluorescence spectra of **1** (20 μM) in ethanol/Hepes (2: 1, v/v) upon addition of Cr^{3+}. b) Fluorescence intensity ratio $F_0/(F-F_0)$ at 580 nm of **1** vs **1**/[Cr^{3+}] (■) and [Cr^{3+}] (▼) (C_1 = 20 μM, λ_{ex} = 420 nm). Time interval between two adjacent measurements was 5 min.

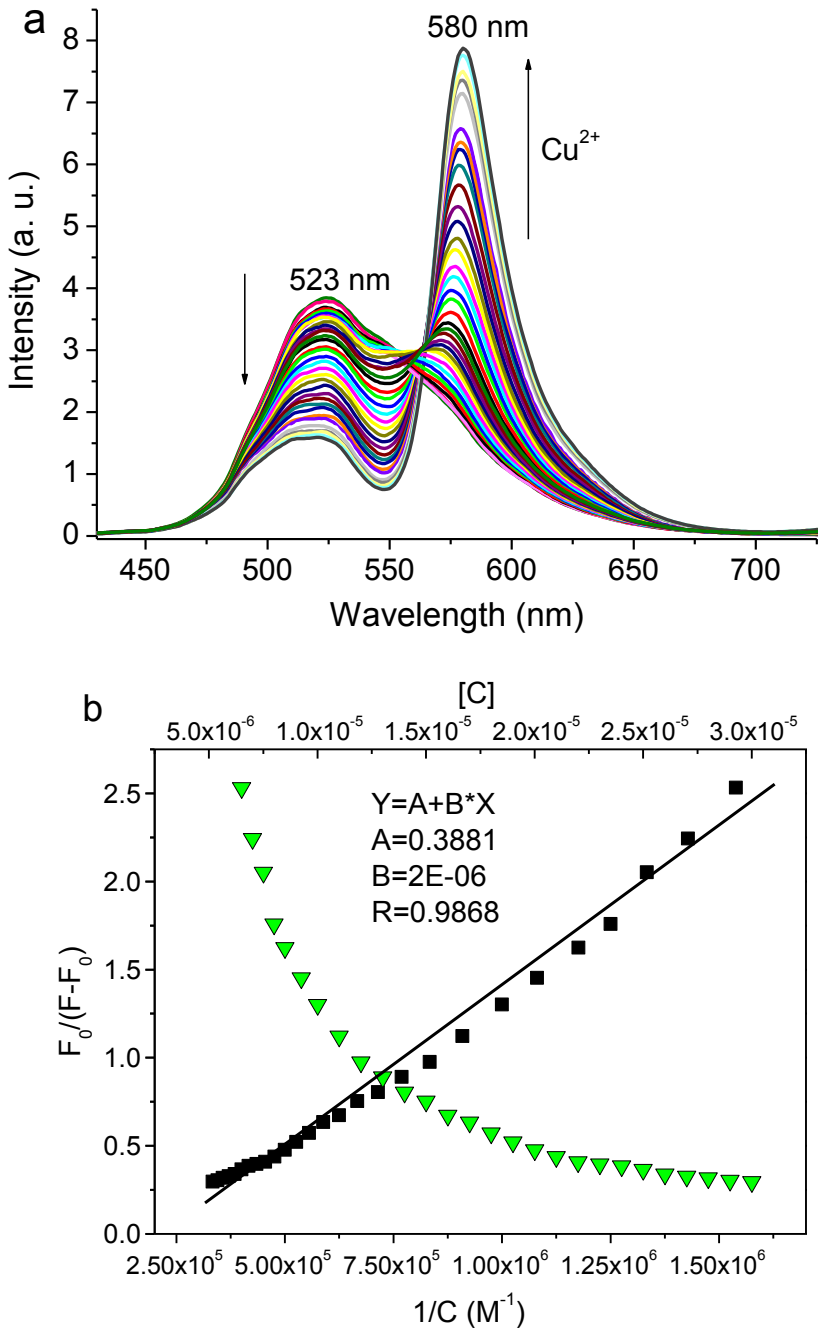

Fig. S5 a) Fluorescence spectra of **1** (20 μM) in ethanol/Hepes (2 : 1, v/v) upon addition of Cu^{2+}. b) Fluorescence intensity ratio $F_0/(F-F_0)$ at 580 nm of **1** *vs* **1**/[Cu^{2+}] (■) and [Cu^{2+}] (▼) (C_1 = 20 μM, λ_{ex} = 420 nm). Time interval between two adjacent measurements was 5 min.

4. Efficiency of energy transfer

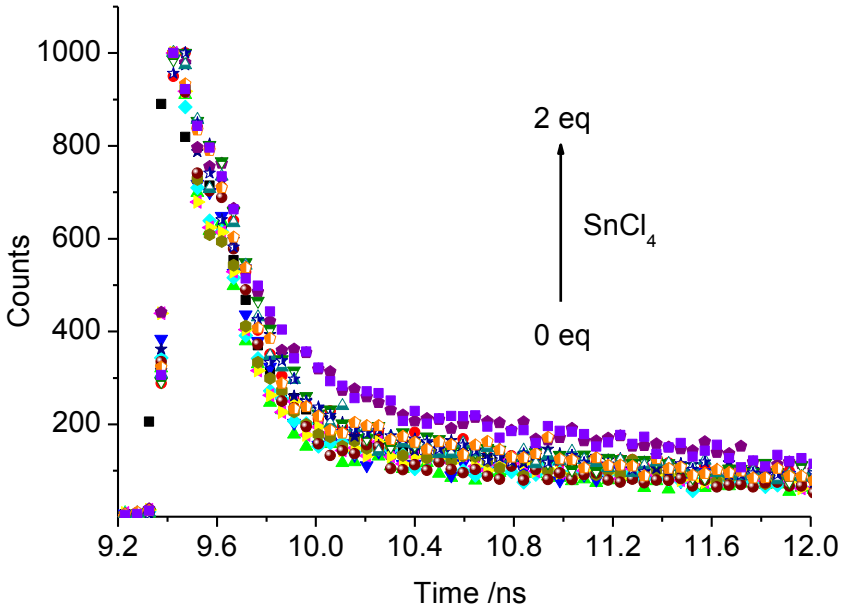

Fig. S6 Lifetime decay profiles (λ_{ex} = 371 nm, monitored at 560 nm) of **1** on addition of different amounts of $SnCl_4$ in ethanol/Hepes (2:1, v/v, pH 7.2) ([**1**] = 2.0×10^{-5} M).

The efficiency of the energy transfer was investigated according to Förster theory. Efficiency of energy transfer (E) can be obtained from following equation:

$$E = 1 - \frac{\tau_{DA}}{\tau_D}$$

In this equation, τ_{DA} is the fluorescence lifetime of the donor in the presence of the acceptor and τ_D is the fluorescence lifetime of the donor in the absence of the acceptor.

5. Kinetic response

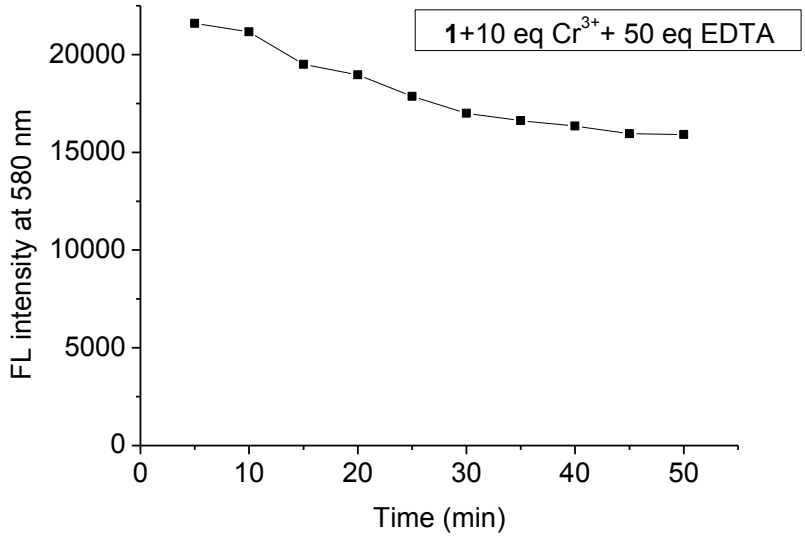

Fig. S7 Variation of fluorescence intensity (580 nm) of **1** (20 μM) in the presence of 10 equiv Cr^{3+} ion and by addition of 50 equiv EDTA in ethanol/Hepes solution (2:1, v/v, pH 7.2). Time interval between two adjacent measurements was 5 min.

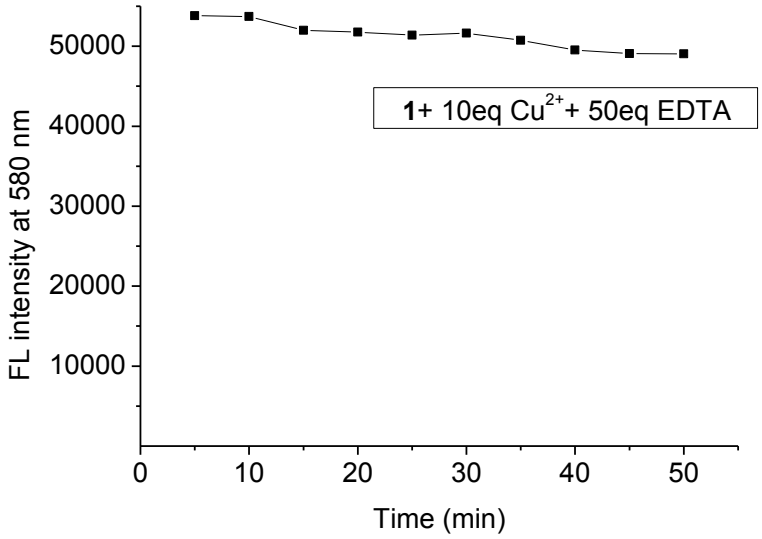

Fig. S8 Variation of fluorescence intensity (580 nm) of free **1** (20 μM) in the presence of 10 equiv Cu^{2+} ion and by addition of 50 equiv EDTA in ethanol/Hepes solution (2:1, v/v, pH 7.2). Time interval between two adjacent measurements was 5 min.

6. ESI mass spectrum of the complex

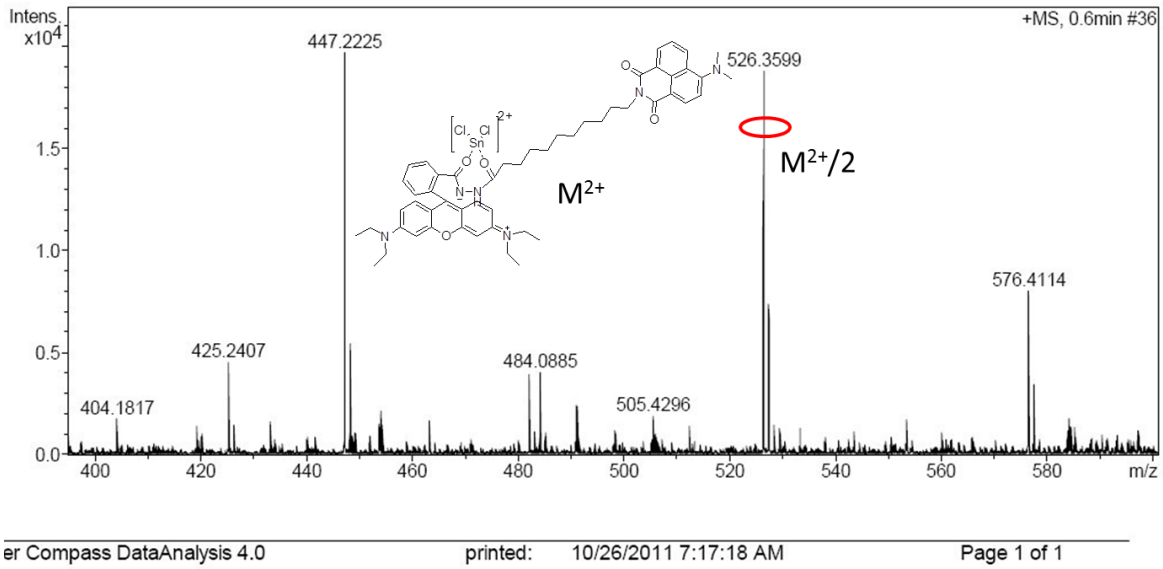

Fig. S9 ESI mass spectra of compound **1** upon binding with tin (IV) chloride.

7. pH response

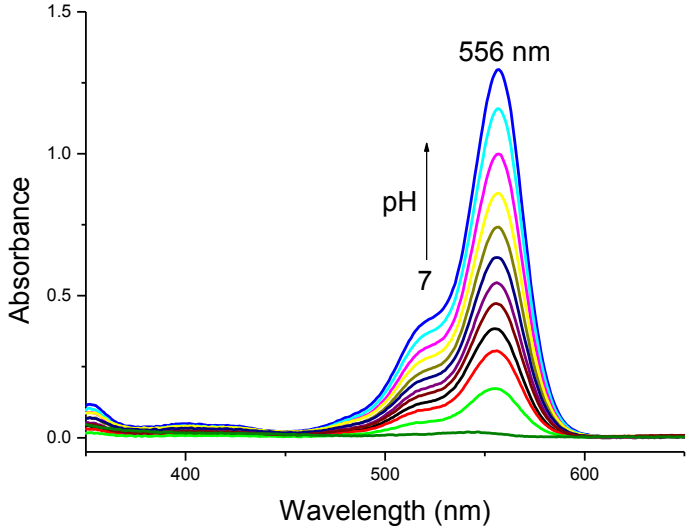

Fig. S10 Variation of absorbance of **1** (20 μM) in ethanol/Hepes solution (2:1, v/v) in different pH conditions. The pH of the solutions was adjusted by addition of 0.2 mol L^{-1} HCl.

8. NMR

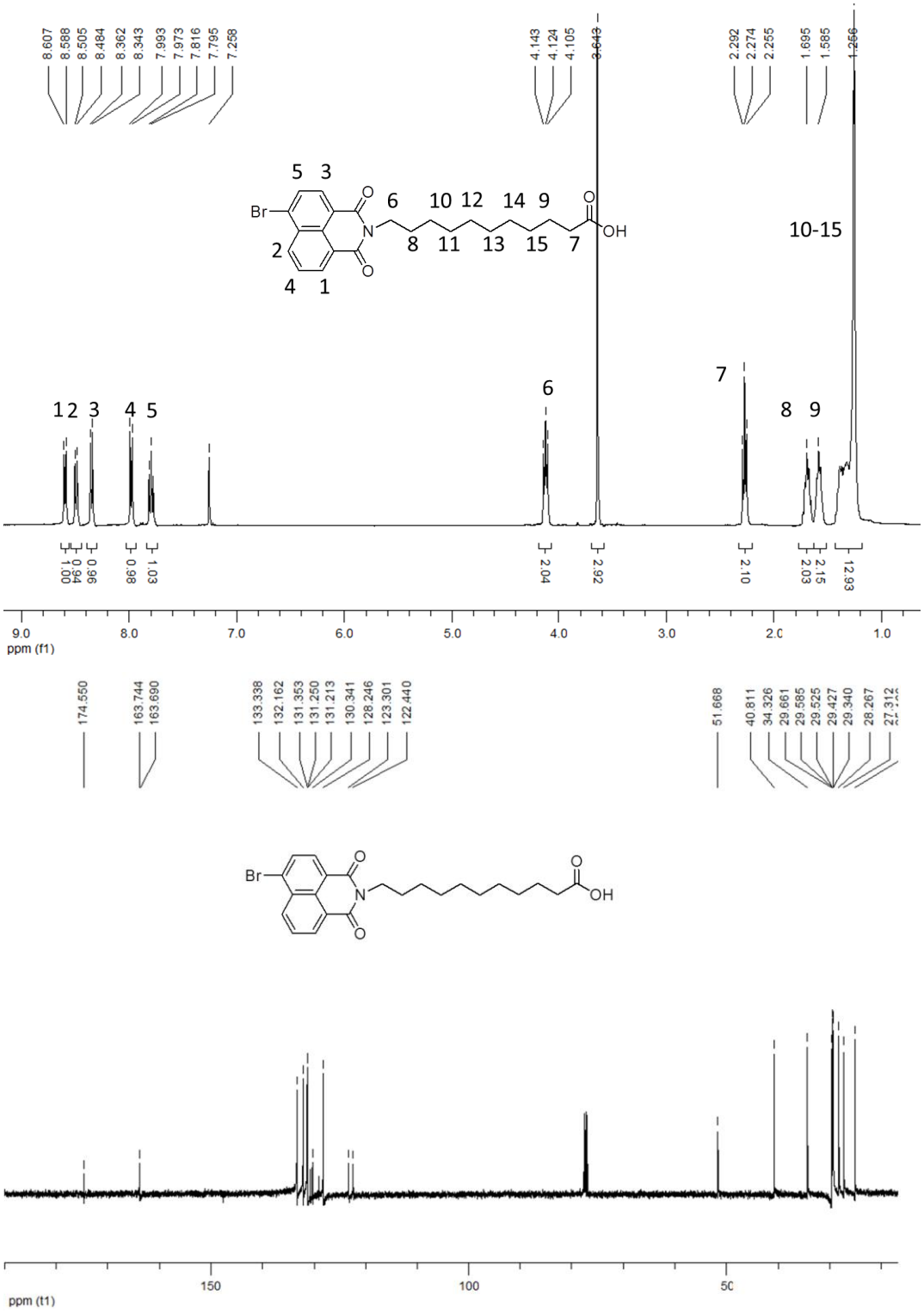

Fig. S11 ^{1}H NMR and ^{13}C NMR spectrum performed on a $CDCl_3$ solution of **2** at 20 ºC.

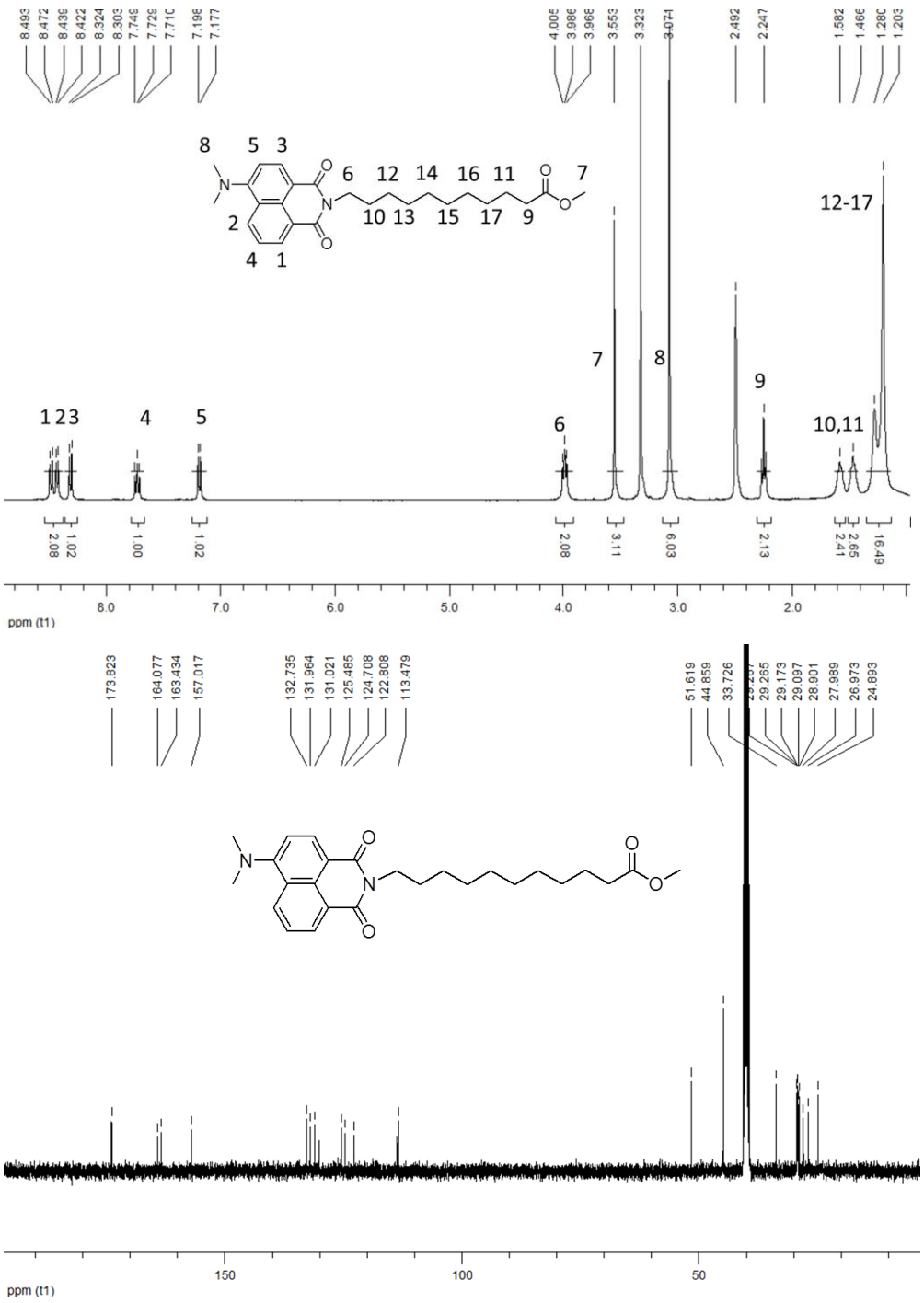

Fig. S12 ^{1}H NMR and ^{13}C NMR spectrum performed on a CD_3OD solution of ester protected **3** at 20 ºC.

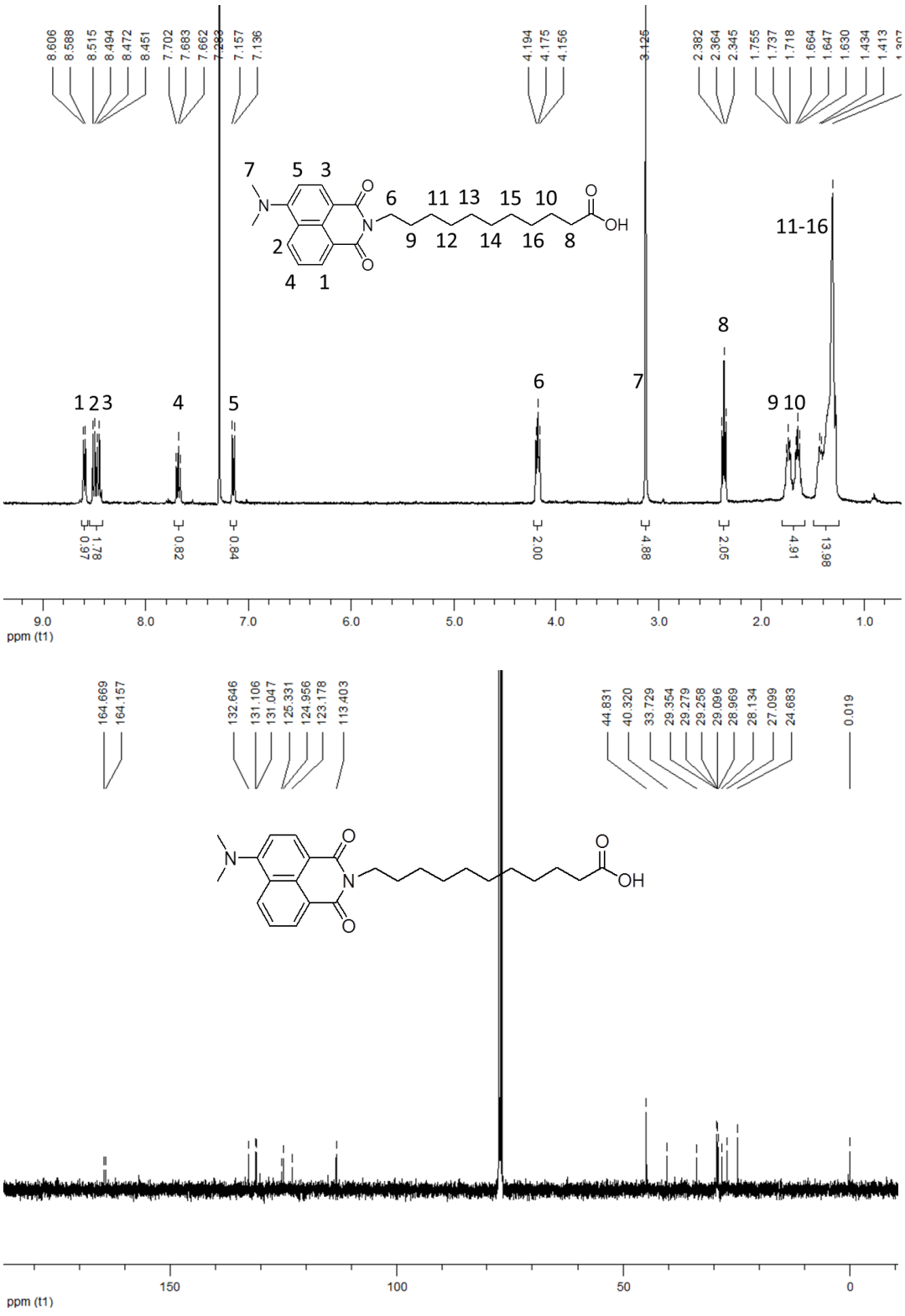

Fig. S13 ^{1}H NMR and ^{13}C NMR spectrum performed on a $CDCl_3$ solution of **3** at 20 ºC.

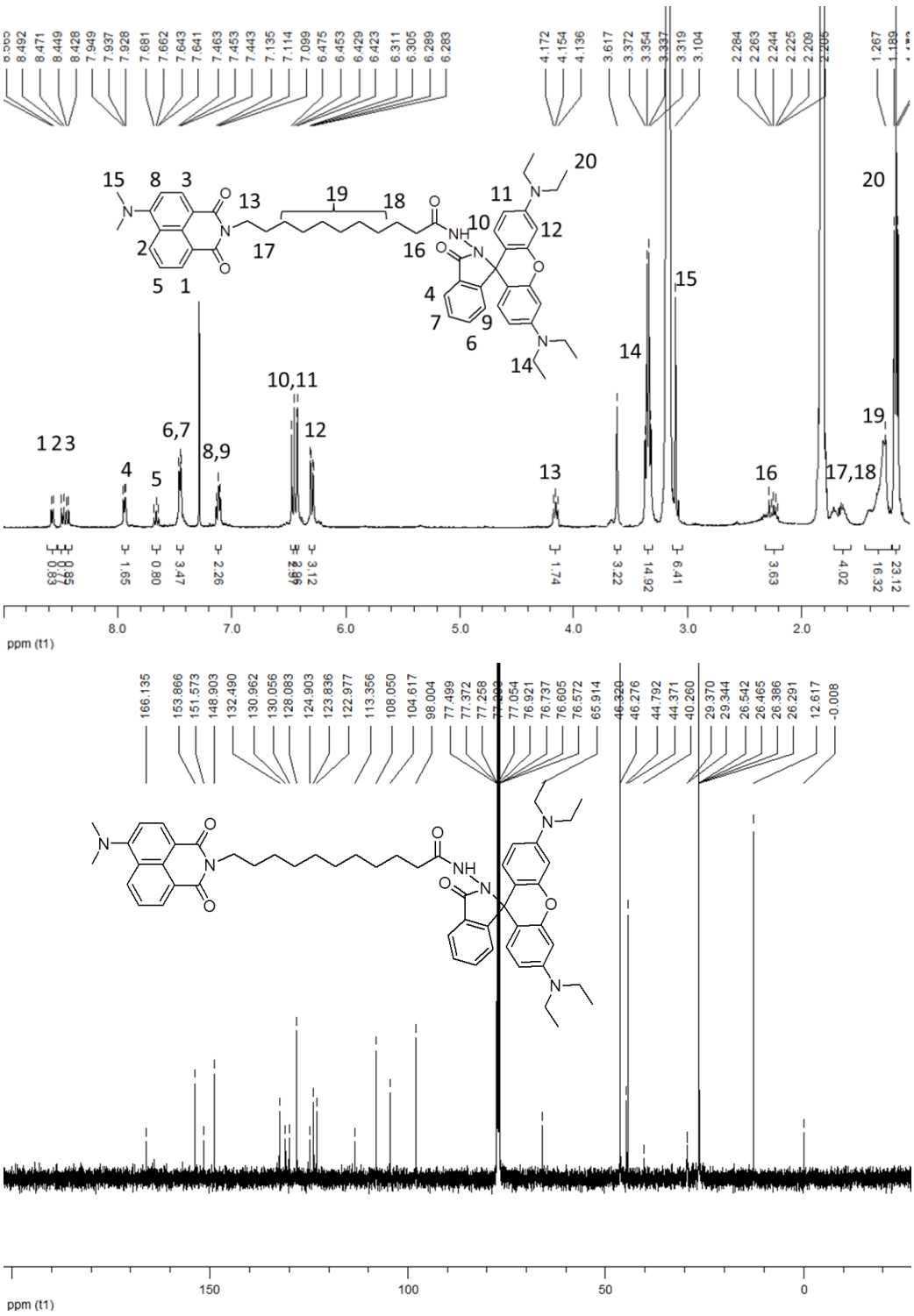

Fig. S14 ^{1}H NMR and ^{13}C NMR spectrum performed on a $CDCl_3$ solution of **1** at 20 ºC.