Supporting Information for

A water-soluble and lysosome-targeted pH fluorescent probe for analytical monitoring of cellular oxidative stress and in vivo non-invasive imaging of alcoholic gastritis in mice

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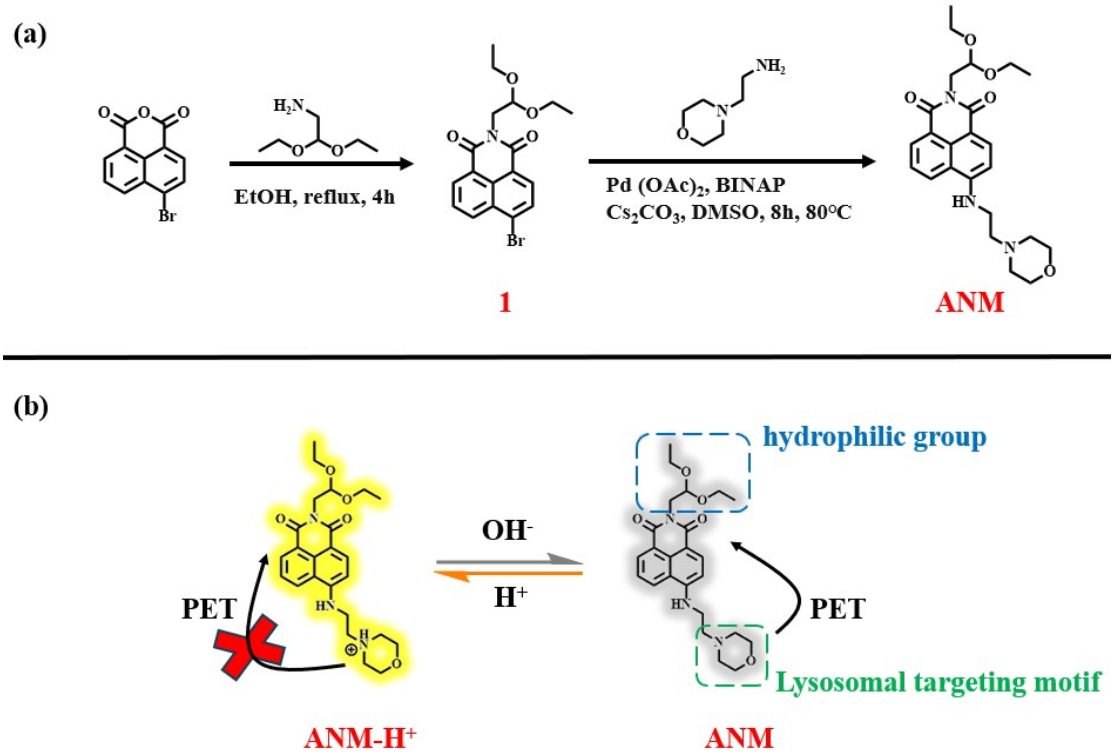
Calculation of fluorescence quantum yield

The fluorescence quantum yield is calculated by the equation $Y_u = (Y_s*F_u*A_s)/(F_s*A_u)$.

Y_u is the fluorescence quantum yield of the substance to be measured, Y_s is the fluorescence quantum yield of the reference substance, F_u is the integrated fluorescence intensity of the substance to be measured, F_s is the integrated fluorescence intensity of the reference substance, A_u is the absorbance of the substance to be measured, and A_s is the absorbance of the reference substance.



Scheme S1. (a) Synthesis process of probe **ANM**; (b) Response mechanism of probe **ANM** to pH.

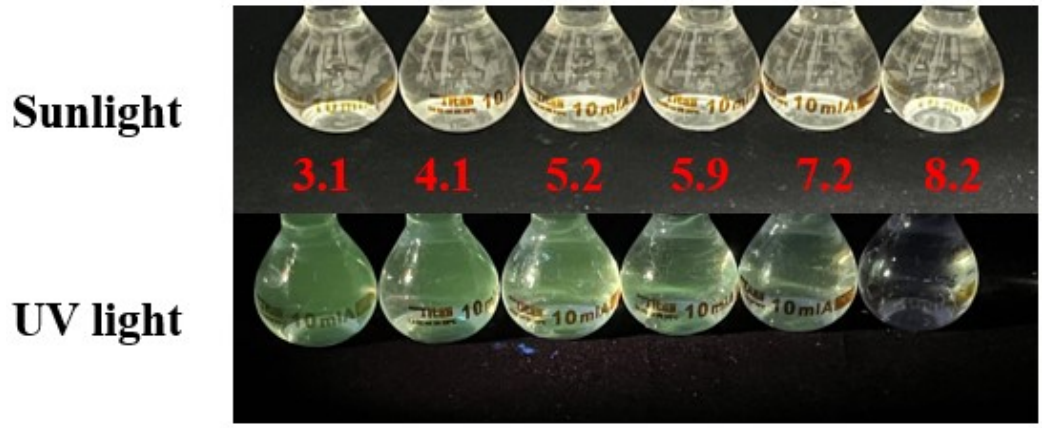


Fig. S1. Pictures of probe **ANM** in different pH solutions under natural light and UV light.

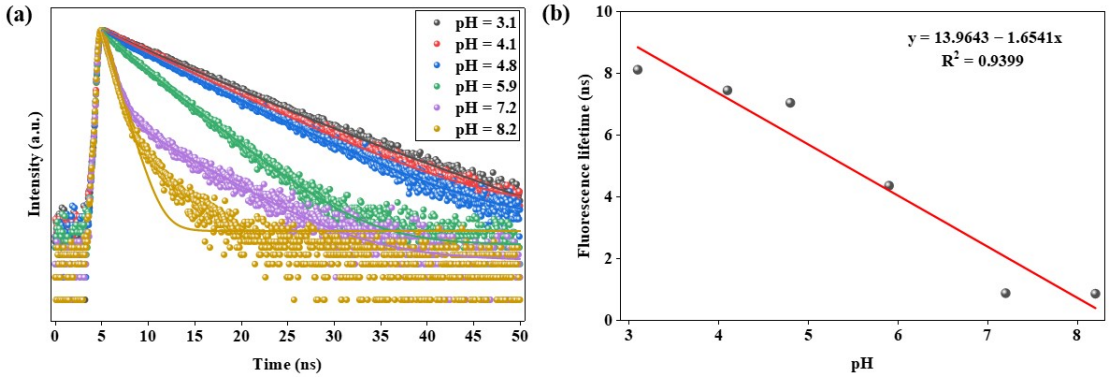


Fig. S2. (a) Fluorescence lifetime of probe **ANM** in different pH solutions (b) Linear relationship between solution pH and fluorescence lifetime.

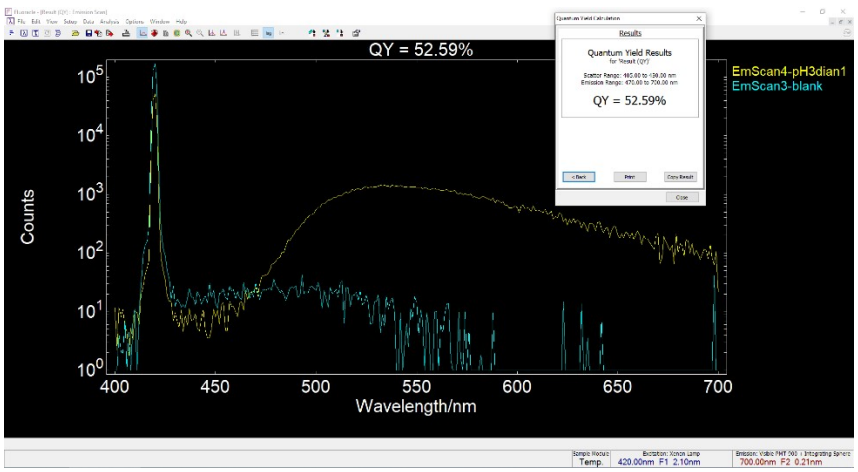


Fig. S3. Fluorescence quantum yield of probe **ANM** in pH = 3.1 solution.

Table S1. Fluorescence lifetime and fluorescence quantum yield of probe **ANM** in solutions of varying pH

pH	Fluorescence lifetime (ns)	Fluorescence quantum yield (%)
3.1	**8.1095**	**52.59**
4.1	**7.4429**	**48.07**
4.8	**7.0408**	**37.06**
5.9	**4.3597**	**26.08**
7.2	**0.8835**	**14.06**
8.2	**0.8673**	**4.54**

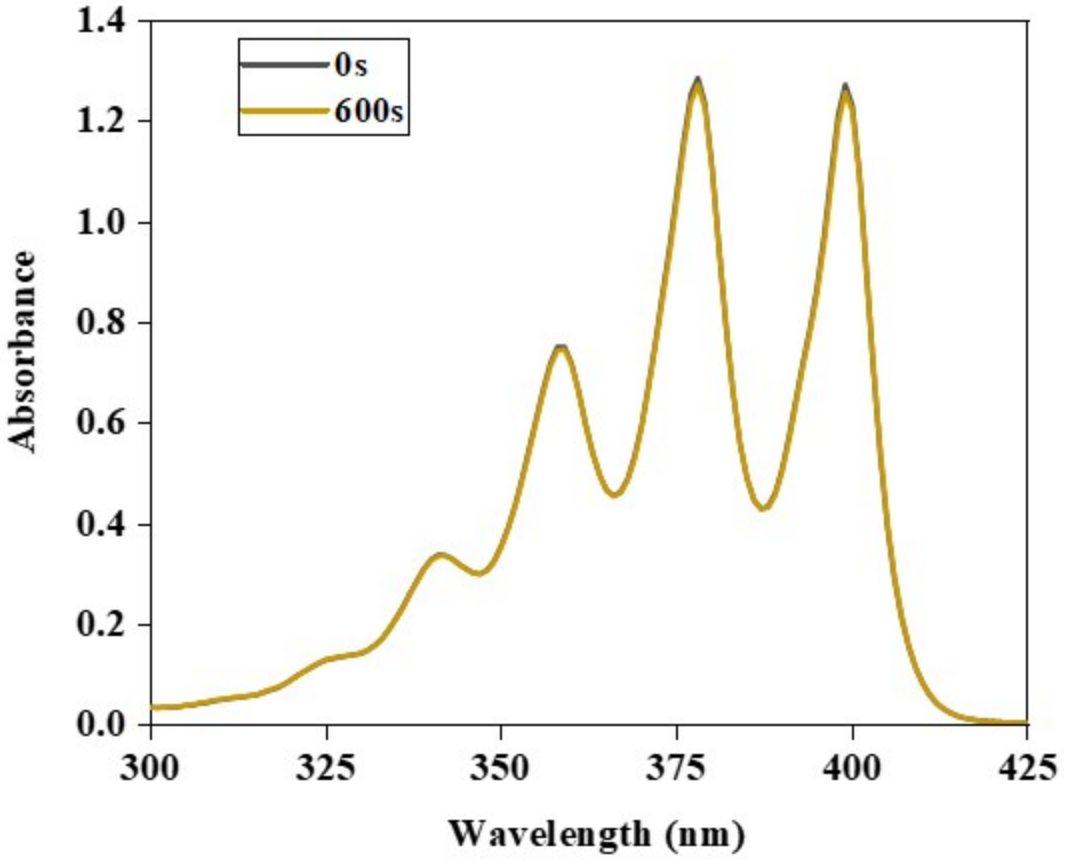


Fig. S4. Singlet oxygen generated by probe **ANM** after 10 minutes of illumination via ABDA detection.

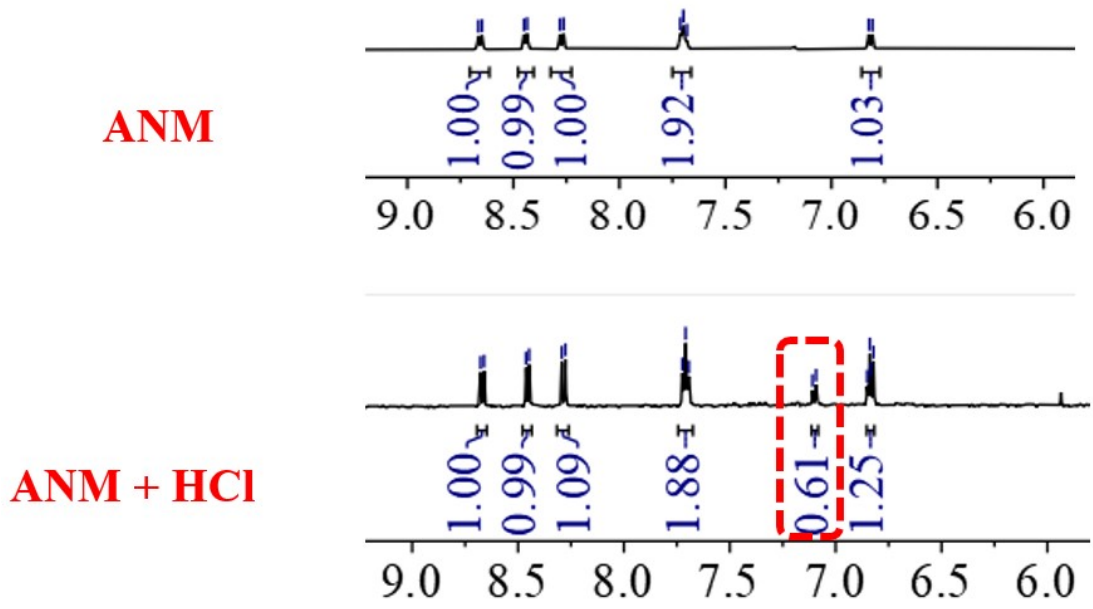


Fig. S5. Mechanism of ^{1}H NMR response of probe **ANM** to pH.

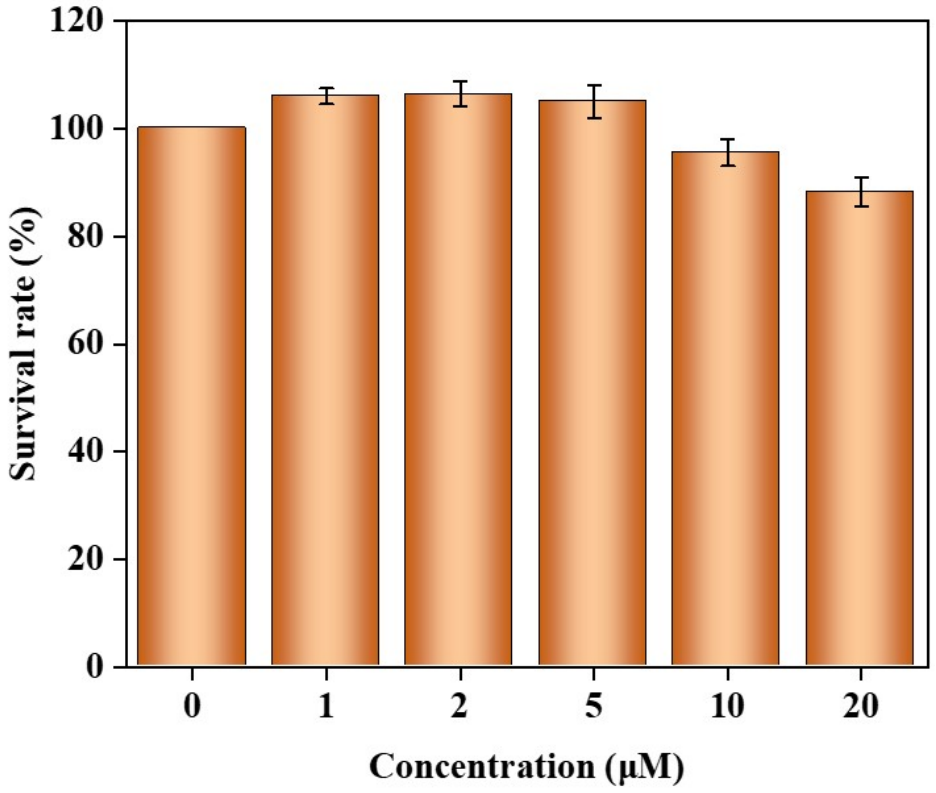


Fig. S6. Cytotoxicity assays of **ANM** at different concentrations for 4T1 cells.

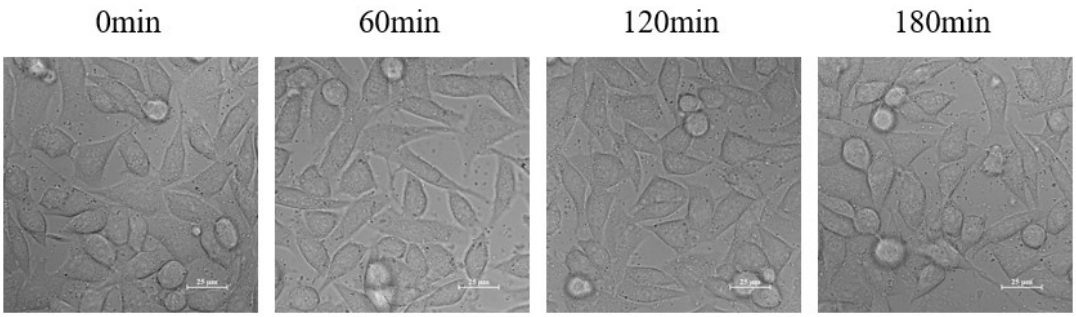


Fig. S7. State diagram of 4T1 cells incubated with probe **ANM** (10μM) for varying durations.

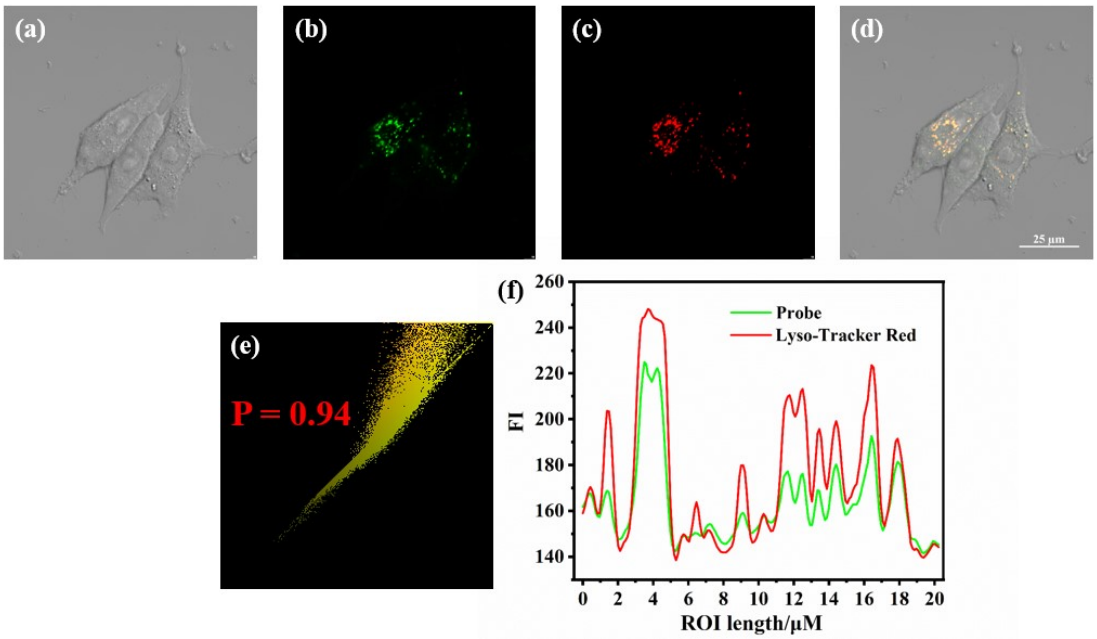


Fig. S8. Confocal images of 4T1 cells (a-d) co-incubated for 30 min using the probe **ANM** (5 μM) and the lysosomal dye Lyso-Detector Red (1 μM). The green channel is (b): λ_{ex} = 488 nm, λ_{em} = 500–550 nm. The red channel is (c): λ_{ex} = 561 nm, λ_{em} = 570–616 nm. (d) The orange channel is a superimposed image of the green channel and the red channel. (e) Intensity correlation plot of **ANM** and Lyso Somal Red. (f) Intensity correlation of **ANM** and Lyso-Detector Red. Scale bar: 25 μm.

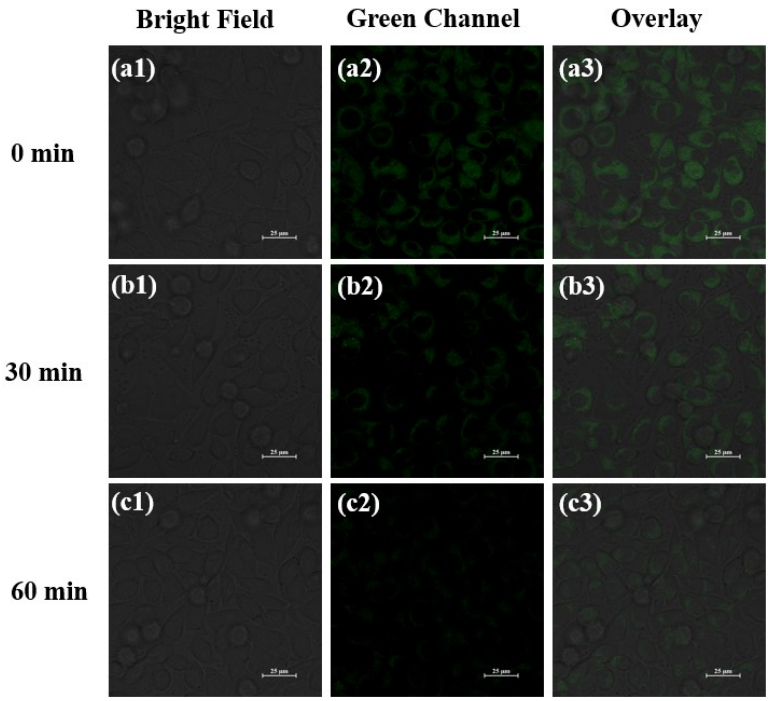


Fig. S9. Imaging chloroquine-induced fluctuations in lysosomal pH. λ_{ex} = 488 nm, λ_{em} = 500-550 nm. Scale bar: 25 μm

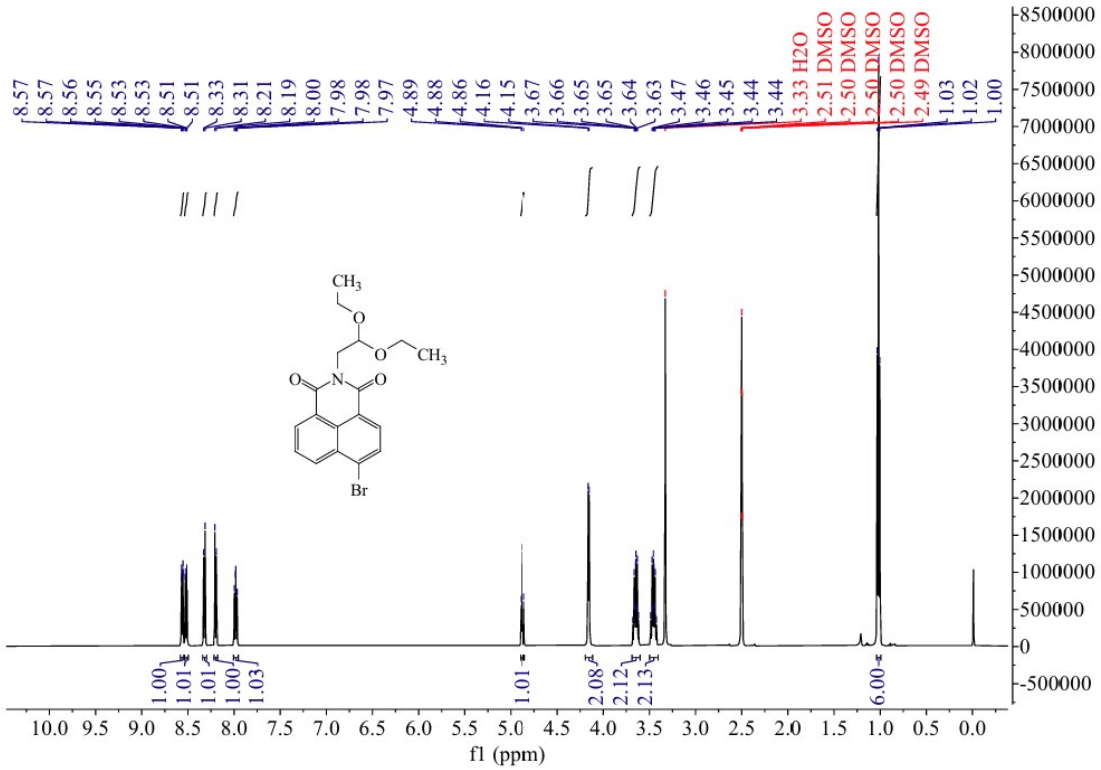


Fig. S10. ^{1}H-NMR (DMSO-d_6) spectrum of Compound 1.

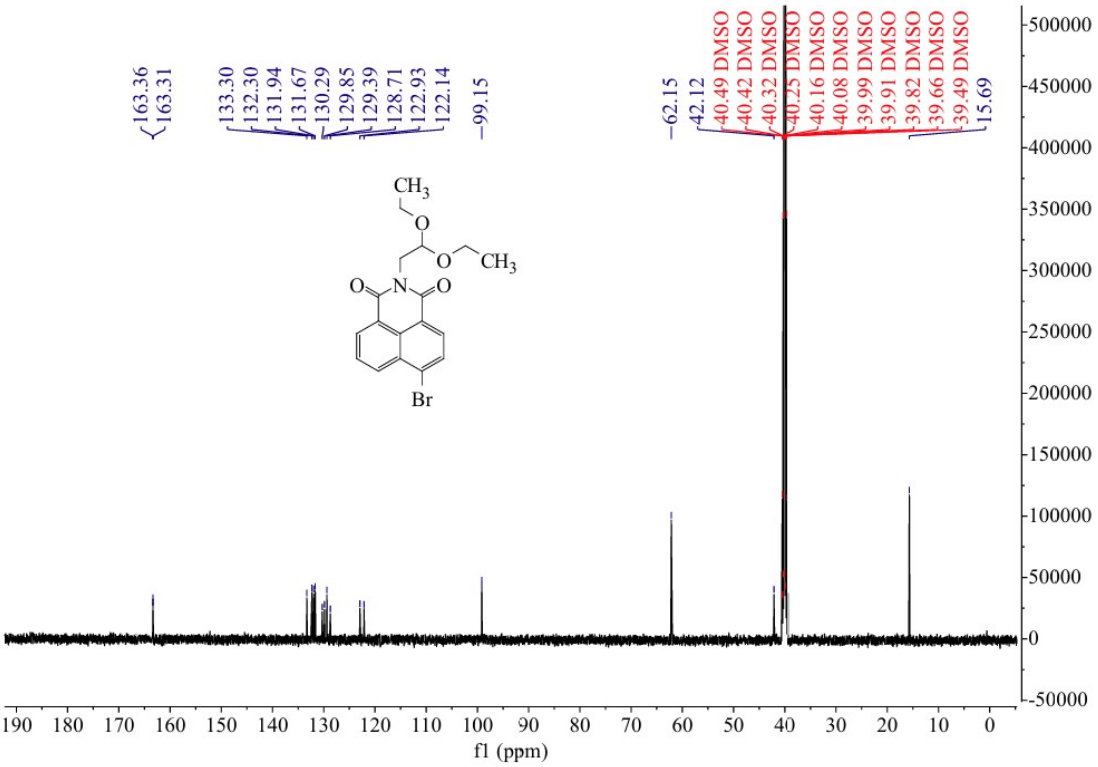


Fig. S11. ^{13}C-NMR (DMSO-d_6) spectrum of Compound 1.

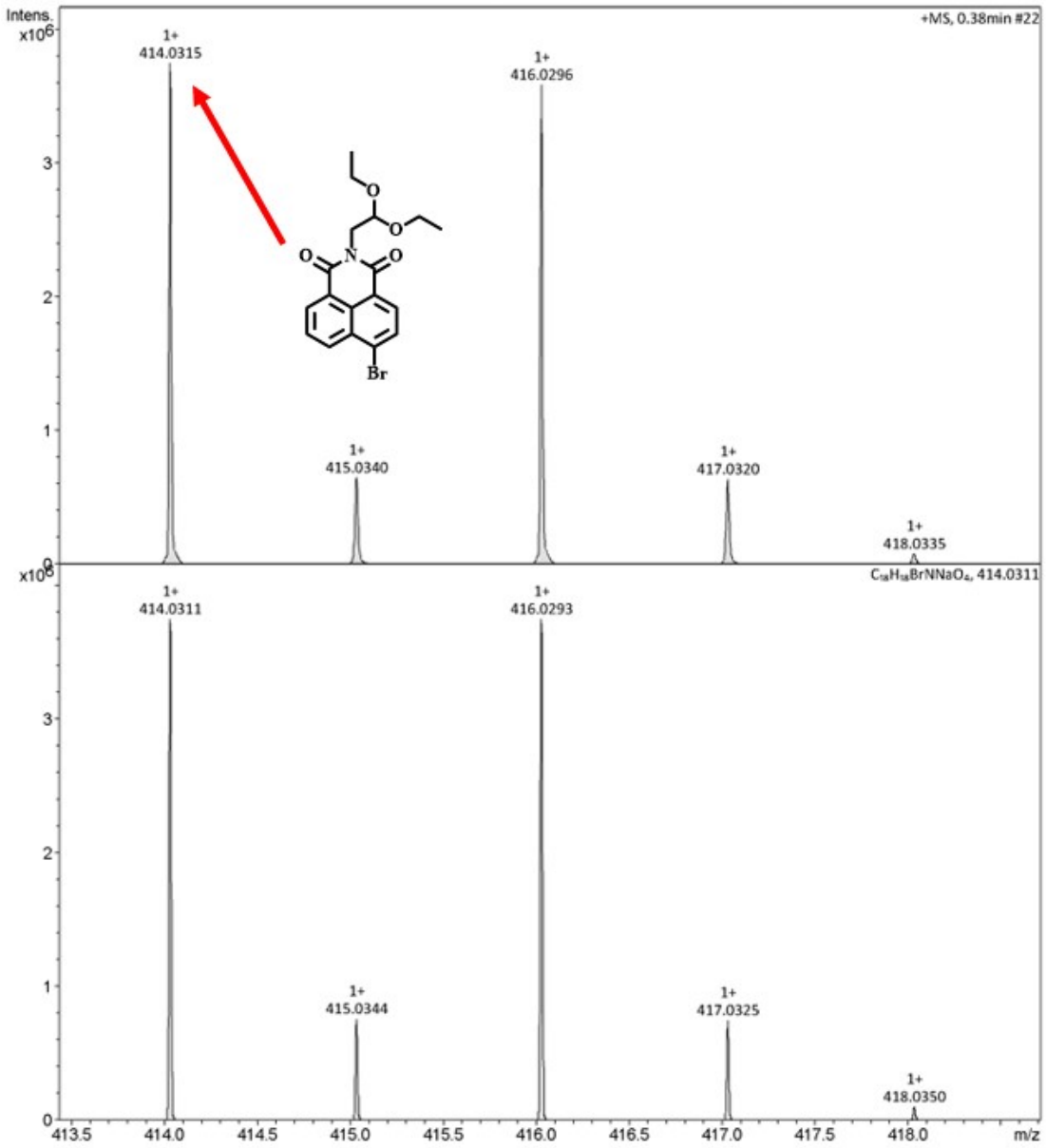


Fig. S12. HRMS (ESI) spectrum of Compound 1.

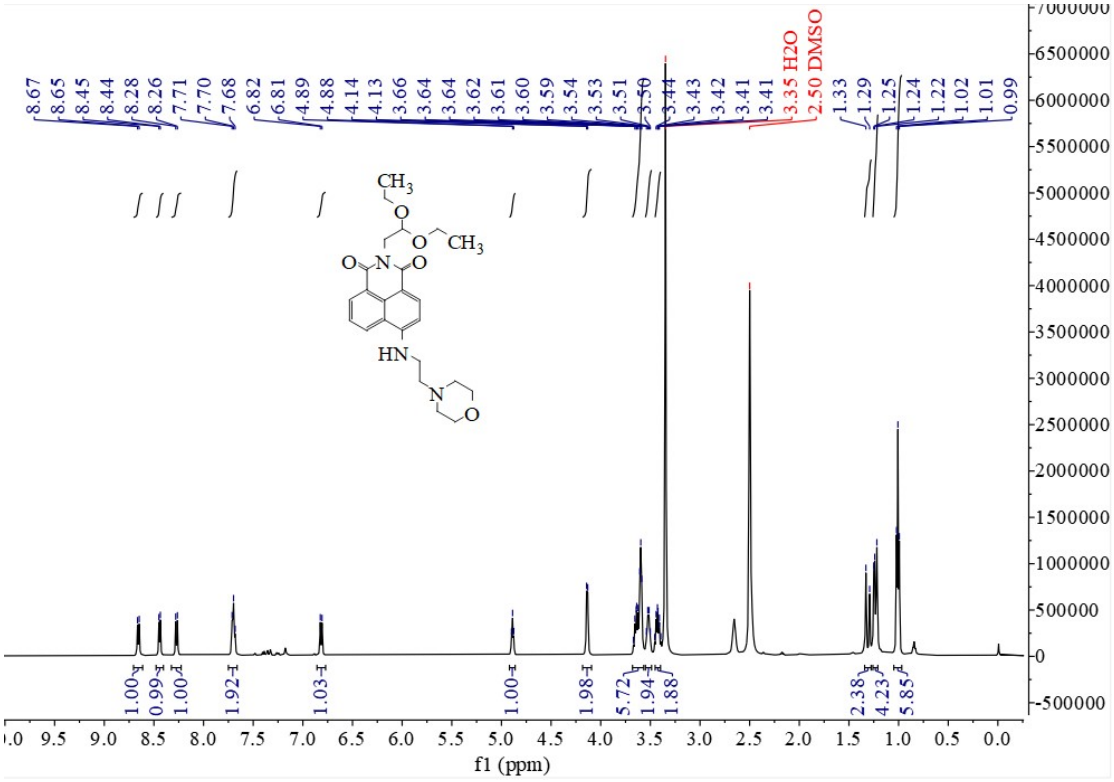


Fig. S13. ^{1}H-NMR (DMSO-d_6) spectrum of Compound **ANM**.

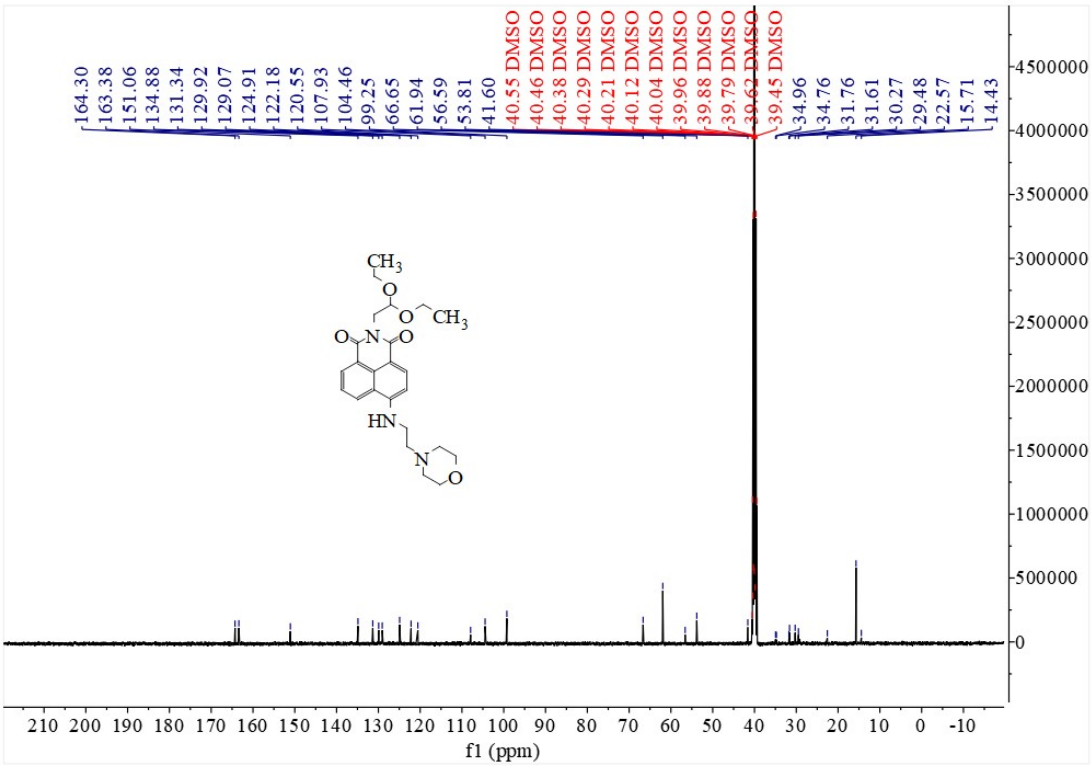


Fig. S14. ^{13}C-NMR (DMSO-d_6) spectrum of Compound **ANM**.

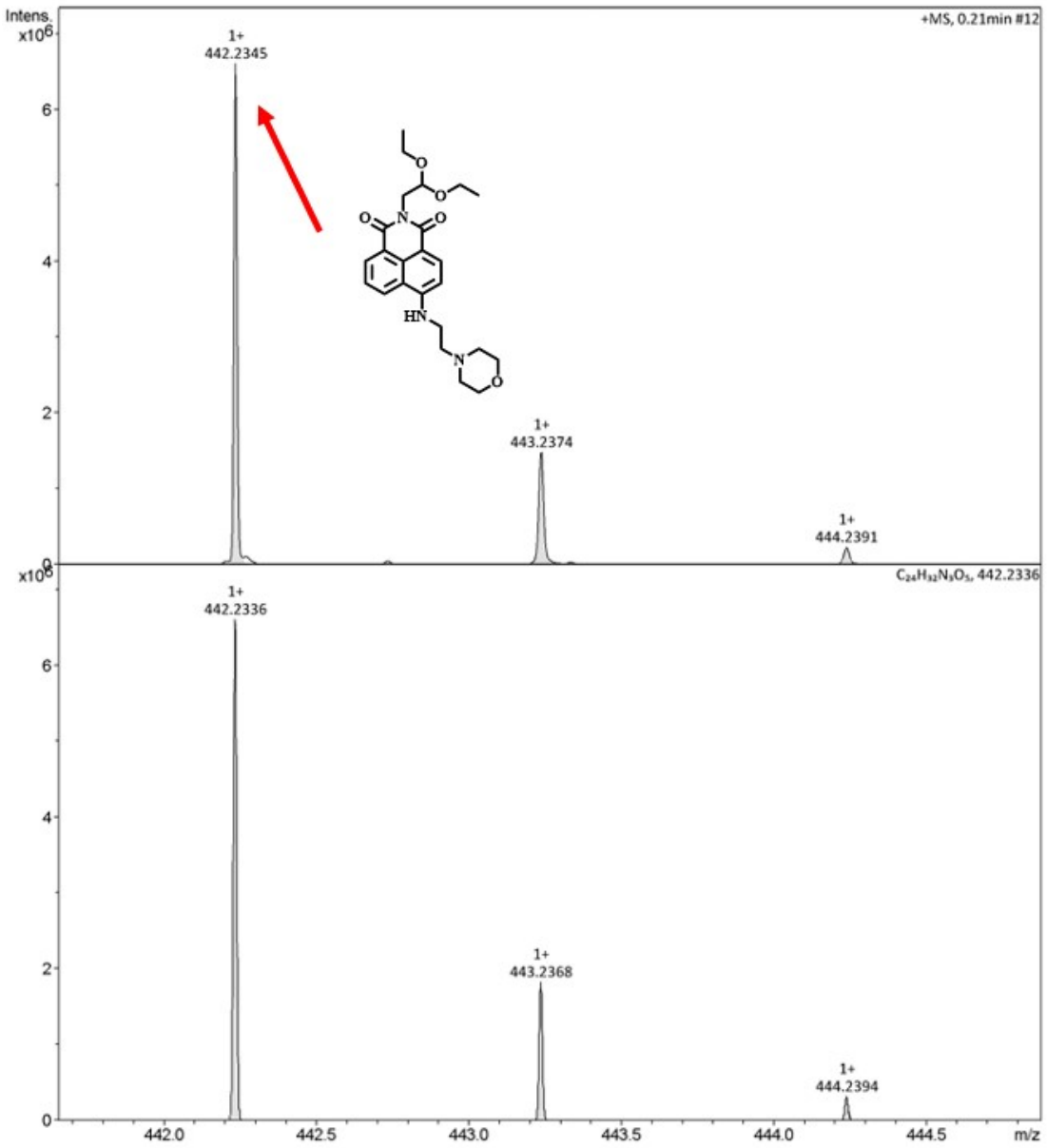


Fig. S15. HRMS (ESI) spectrum of **ANM**.