

Supporting Information

A single fluorescent probe for imaging ribonucleic acid and sulfur dioxide in living systems and unique application in tumor and normal animals†

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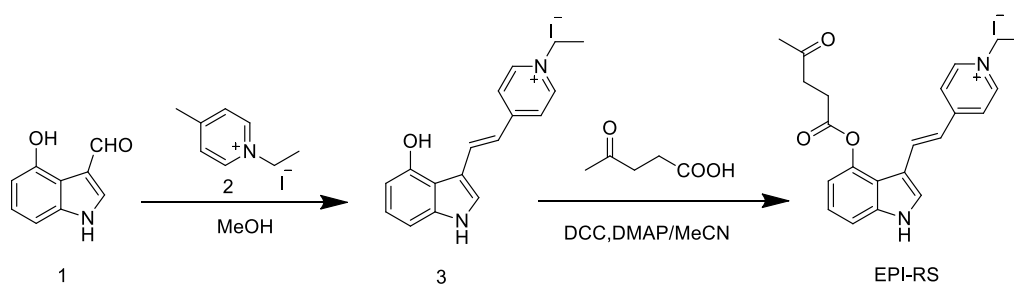
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1. Synthesis



Scheme. S1. The synthetic route to the probe **EPI-RS**.

2. Calculation of RNA /DNA concentration

RNA/DNA concentration was calculated by follow equation. The ultraviolet absorption intensity stranded for size of the electron energy level transition probability, and abides by the lambert beer's law (1).

$$A = -\log \frac{I}{I_0} = \varepsilon cl \quad (1)$$

A stand for absorbance; ε stand for extinction coefficient, extinction coefficient of RNA is 7700 (DNA is 6600); c stand for molar concentration; l stand for length of sample pool; I_0 and I stand for intensity of the incident light and transmission light, respectively.

3. Fig.S1

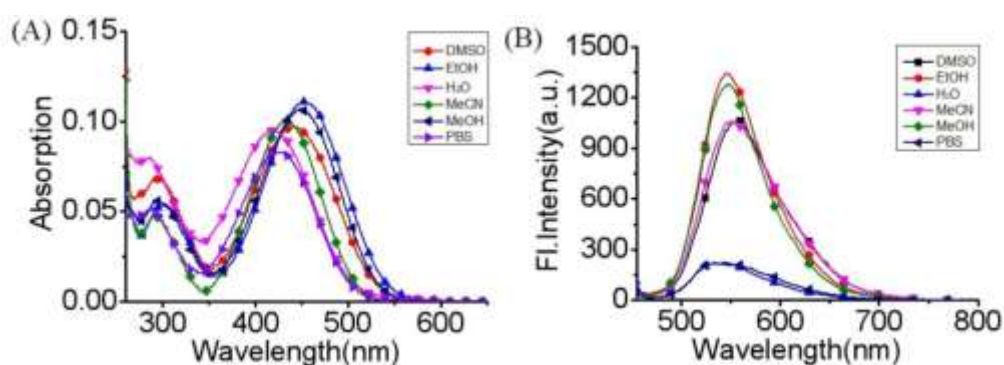


Fig. S1 (A) Absorption spectra and (B) fluorescence responses of **EPI-RS** in various solvents. [**EPI-RS**]: 10 μ M.

4. Table S1

Table S1 The photophysical properties of **EPI-RS** in various solvents.

Solvents	λ^a / λ^b (nm)	Stokes shifts	$^c\Phi$
DMSO	442/560	118	13.3
EtOH	453/545	93	13.7
H ₂ O	417/534	117	3.2
MeCN	434/550	116	13.5
MeOH	448/548	100	12.9
PBS	424/554	120	0.2374

^aMaximum absorption wavelength (nm). ^bMaximum emission wavelength (nm). ^c Φ is fluorescence quantum yield (error limit: 8%) determined by using Rhodamine 6G ($\Phi=0.95$) in Water as the standard.

5. Fig. S2

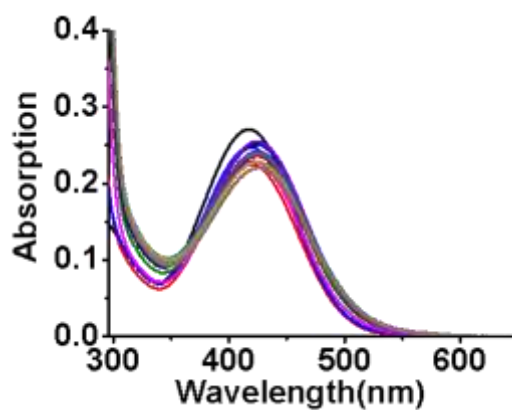


Fig. S2 Absorption spectra and of **EPI-RS** with the addition of RNA (0–4000 equiv.) in PBS buffer solution. [EPI-RS]: 1.5×10^{-4} μ M.

6. Fig. S3

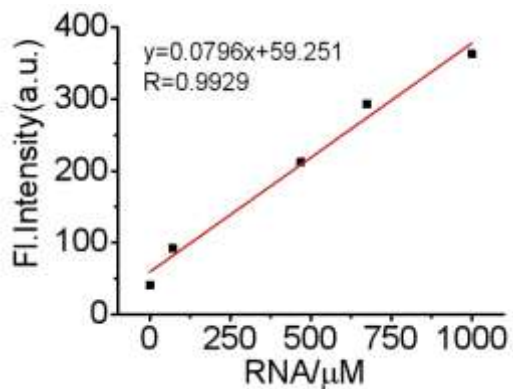


Fig. S3 The limit of detection for RNA.

7. Fig. S4

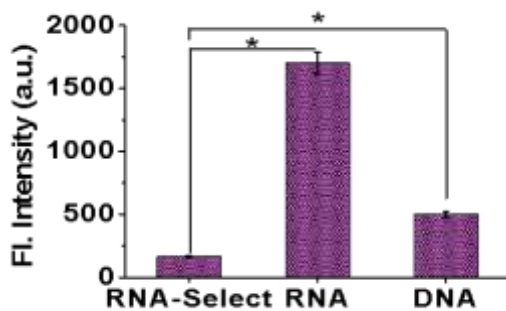


Fig. S4 Fluorescence responses of commercial probes “RNA-Select” (2 μM) in the presence of RNA and DNA. RNA and DNA concentration: 155 mg/mL.

8. Fig. S5

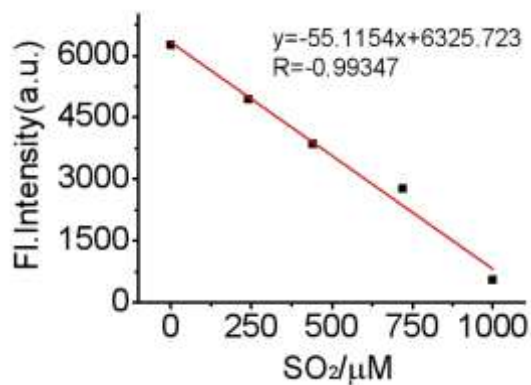


Fig. S5 The limit of detection for SO₂.

9. Fig. S6

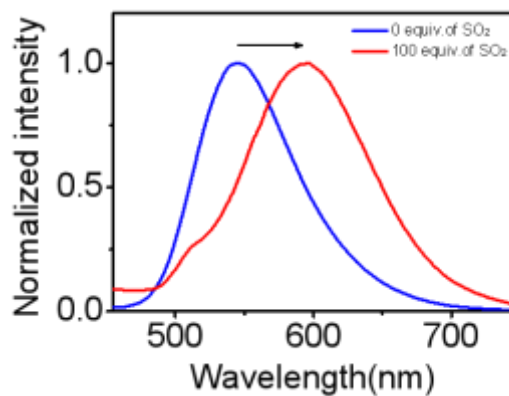


Fig. S6 Fluorescence spectra of EPI-RS (10 μ M) in pH 7.4 PBS buffer solution with the addition of Na₂SO₃.

10. Fig. S7

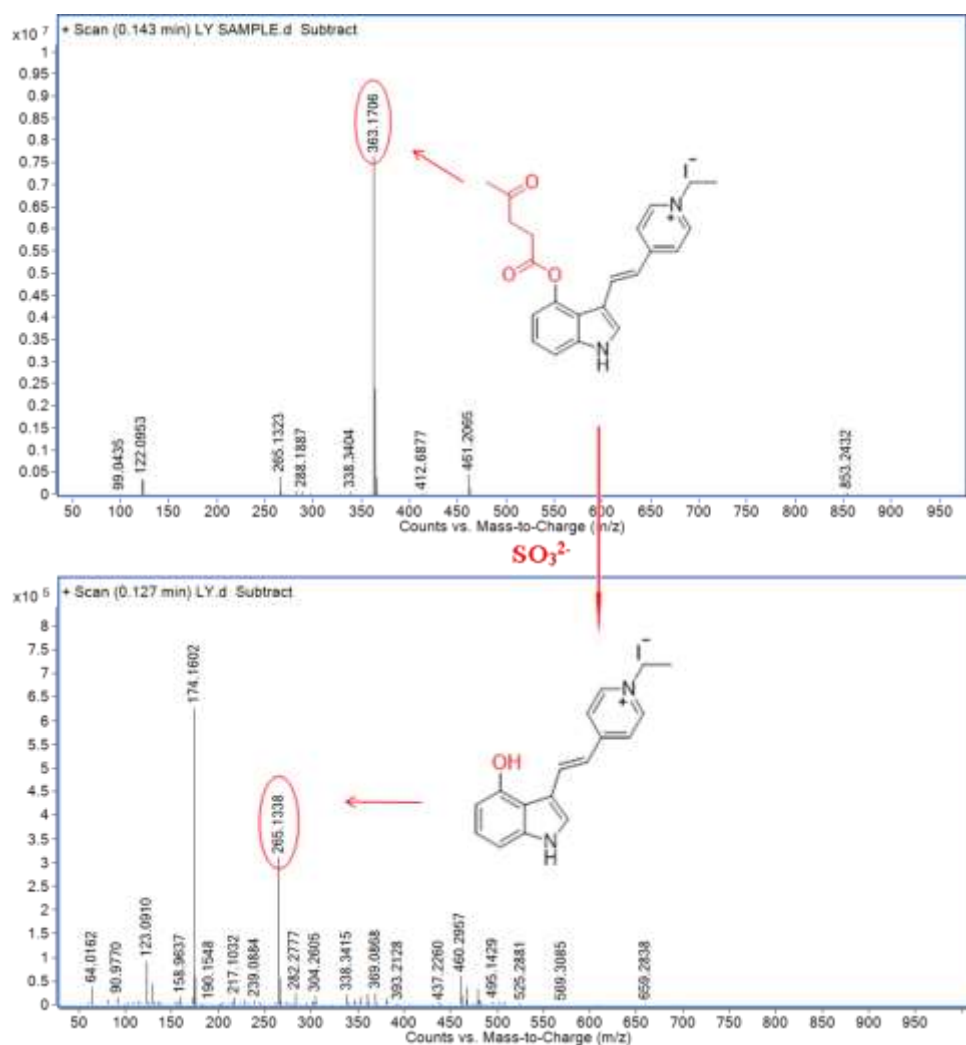


Fig. S7 HRMS spectrum of EPI-RS and **Compound 3**.

11. Table S2 Cytotoxicity Data of **EPI-RS** in 3T-3 cells ^a.

Incubate concentration(μ M)	0	1	5	10	20	30
(% cell survival)	100 \pm 4	99 \pm 4	92 \pm 4	91 \pm 4	86 \pm 4	83 \pm 4

^a Cell viability was quantified by the MTT assays (mean \pm SD).

12. Fig. S8

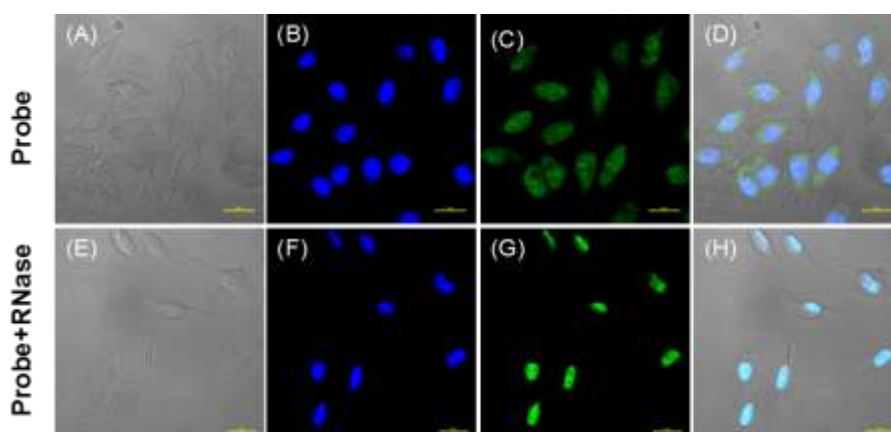


Fig. 8 (A) and (D): Bright-field images. (B) and (F): Fluorescence imaging of cells stained with DAPI (20 μ g/mL). (C): Images of 3T-3 cells treated with 1.0×10^{-5} M **EPI-RS**; (G): Images of 3T-3 cells treated with 1.0×10^{-5} M **EPI-RS** and 20 μ g/mL DNase-Free RNase (GE); (D and H): Merged pictures.

13. Fig. S9

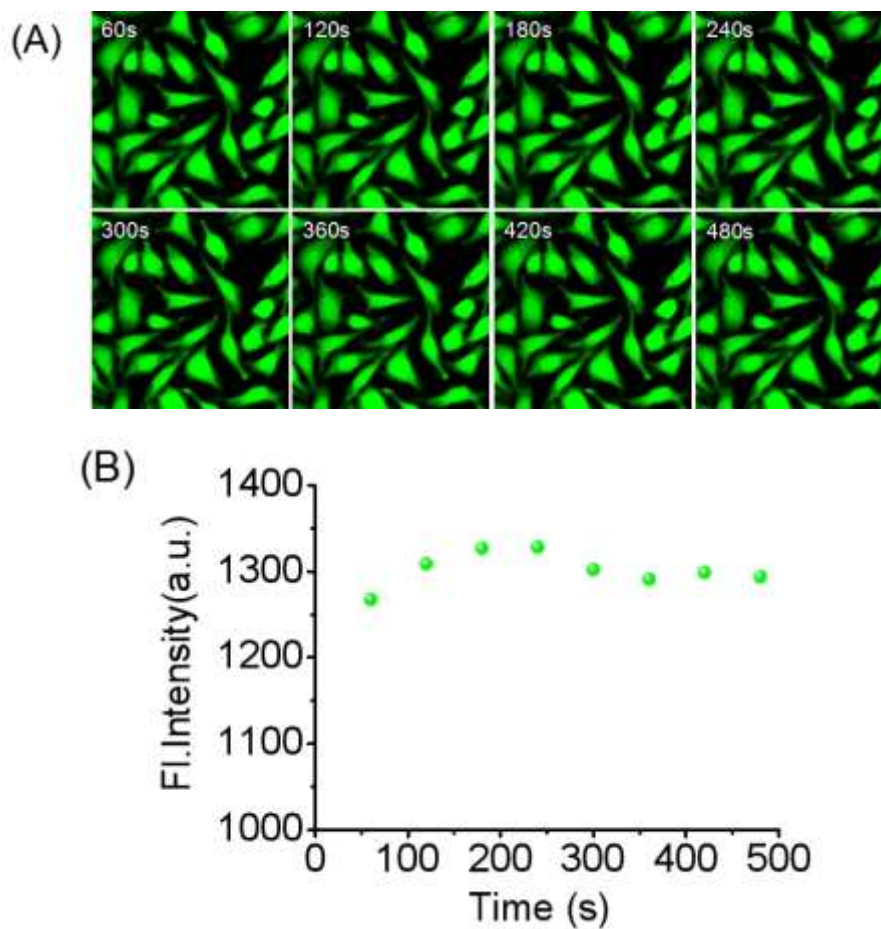


Fig. S9. (A) Fluorescence images (the green channel) of 3T-3 cells incubated with were incubated with **EPI-RS** (10 μ M) acquired at different times under successive excitation. (B) Mean intensities of the cells incubated in the green channel under successive excitation at different times. Images were acquired from 500 to 550 nm for green fluorescence. λ_{ex} = 405 nm. Scale bar = 20 μ m.

14. Characterization

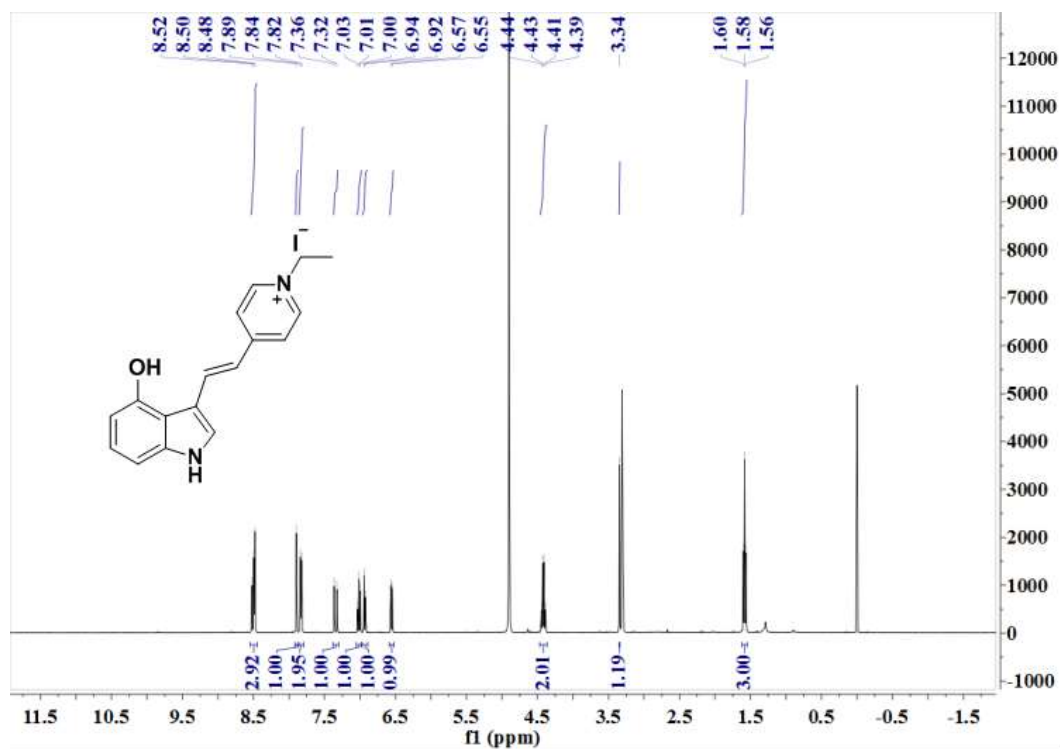


Fig. S10 ^1H NMR spectrum of compound 3

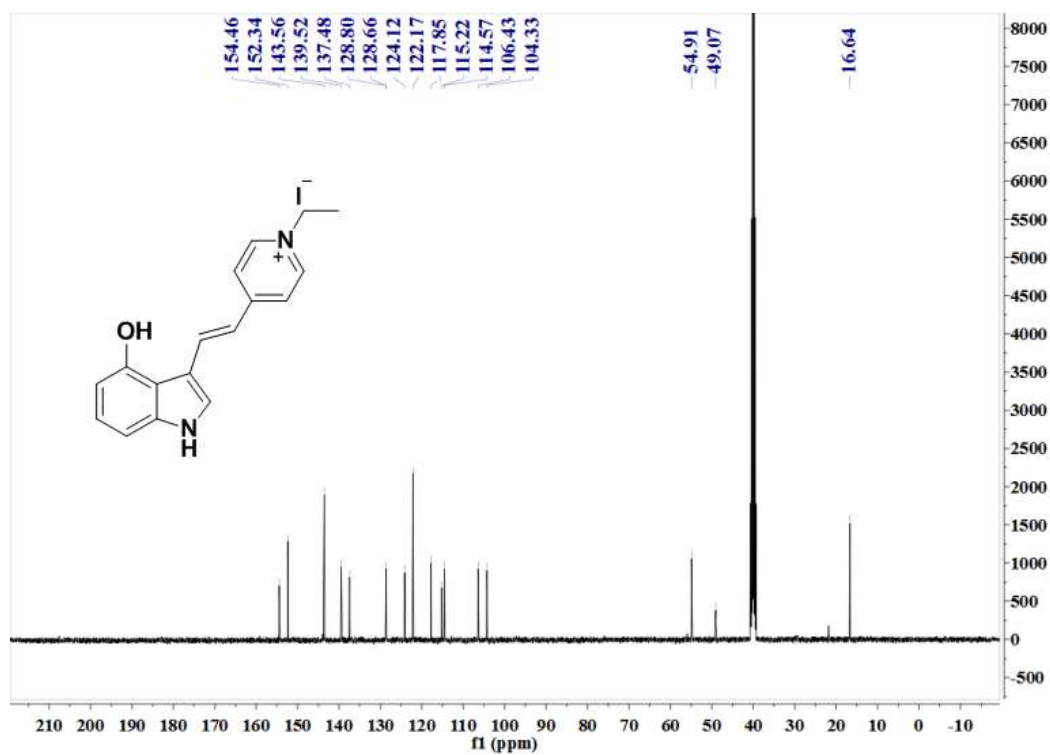


Fig. S11 ^{13}C NMR spectrum of compound 3

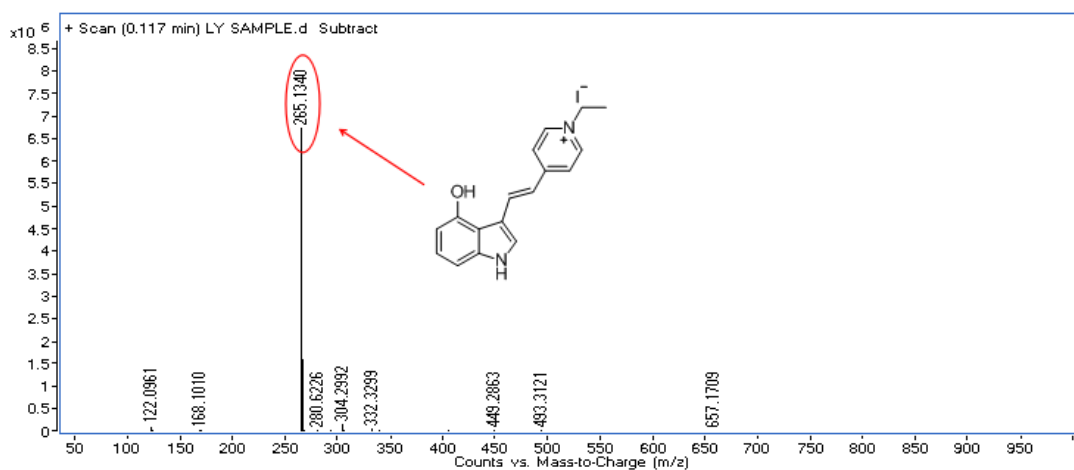


Fig. S12 HRMS spectrum of **compound3**

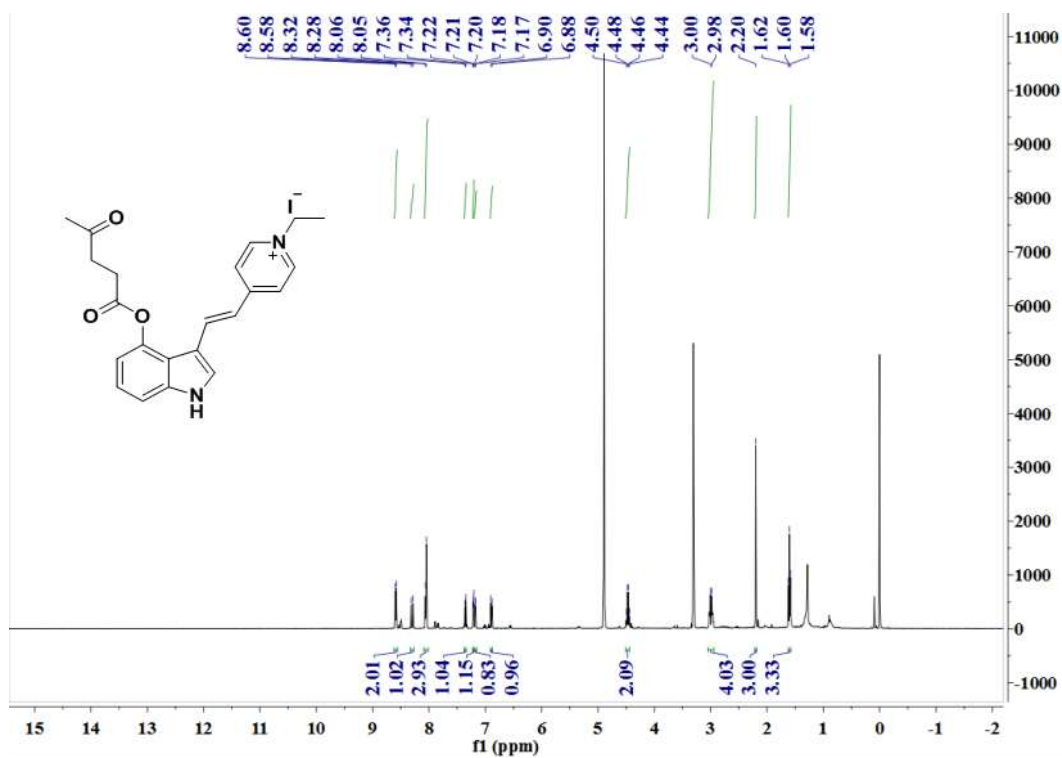


Fig. S13 ¹H NMR spectrum of **EPI-RS**

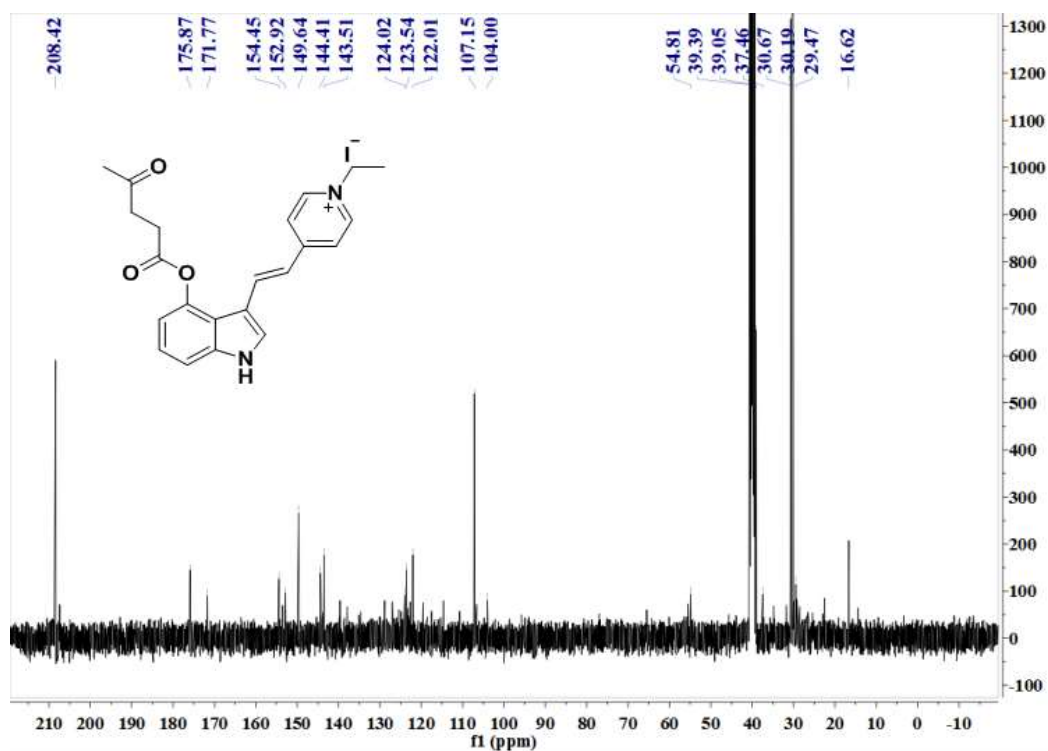


Fig. S14 ^{13}C NMR spectrum of EPI-RS

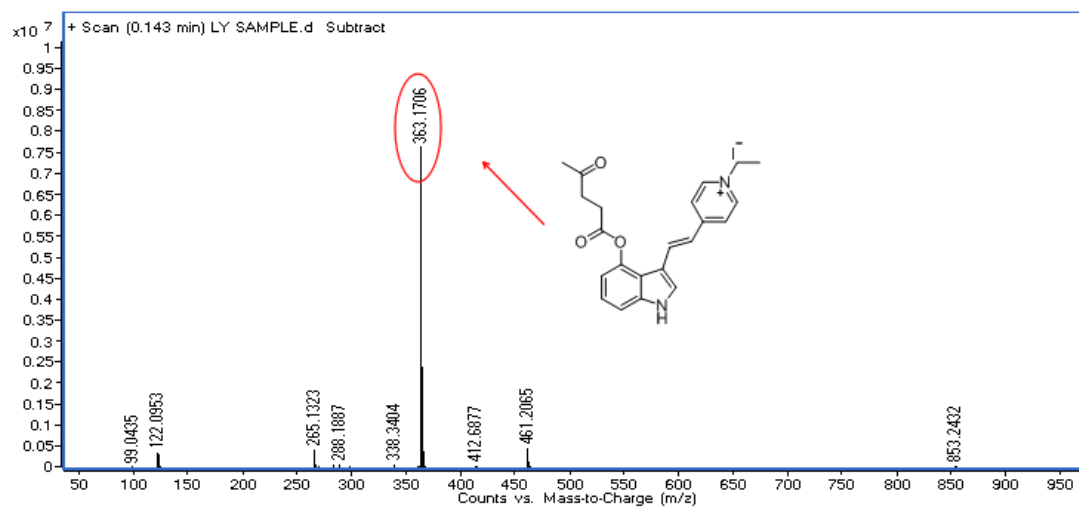


Fig. S15 HRMS spectrum of EPI-RS