Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.


Supporting information

# Unique Polarity-Sensitive Photothermal Sensitizer Revealing Down-regulated Mitochondrial Polarity During Photo-Induced Cell Death

Chuang Liu, Minggang Tian, Weiying Lin*

Institute of Fluorescent Probes for Biological Imaging, School of Chemistry and Chemical Engineering, School of Materials Science and Engineering, University of Jinan, Jinan, Shandong 250022, P. R. China.

Email: weiyinglin2013@163.com

# Contents

## Materials

All chemicals used are of analytical grade, 3-diethylaminophenol, 1,6-dihydroxynaphthalene, triphenylphosphine, 1,4-dibromobutane, etc. were purchased from Sinopharm Chemical Reagent Co., Ltd (Shanghai, China). Sphingomyelin, 1, 2-dipalmitoyl-sn-glycero-3-phospho-(1'-rac-glycerol), cholesterol, lecithin, and 1, 2-dioleoyl-sn-glycero-3-phospho-(1'-rac-glycerol) were purchased from Avanti Polar Lipids (Alabaster, AL, USA). The solvents used in the spectral measurement are of chromatographic grade.

## Spectroscopic measurements

The UV-visible-near-IR absorption spectra of dilute solutions were recorded on a U2910 spectrophotometer using a quartz cuvette having 1 cm path length. One-photon fluorescence spectra of dilute solutions were obtained on a HITACH F-2700 spectrofluorimeter equipped with a 450-W Xe lamp. PBS buffer solution: 10 mM, NaCl, $NaHPO_4 \cdot 12H_2O$, $NaH_2PO_4 \cdot 2H_2O$, pH = 7.40.

## Cell culture

Hepg2 cells were grown in H-DMEM (Dulbecco's Modified Eagle's Medium, High Glucose) supplemented with 10% FBS (Fetal Bovine Serum) in a 5% $CO_2$ incubator at 37 $^{\circ}$C. For cell imaging experiments, live Hepg2 cells were suspended and diluted in the culture medium with cell concentration of 10000 cells/mL. 1 mL of the cell suspension solution was added into glass bottom dish and cultured for 24 h to allow adhesion.

## Figures and tables used in the manuscript

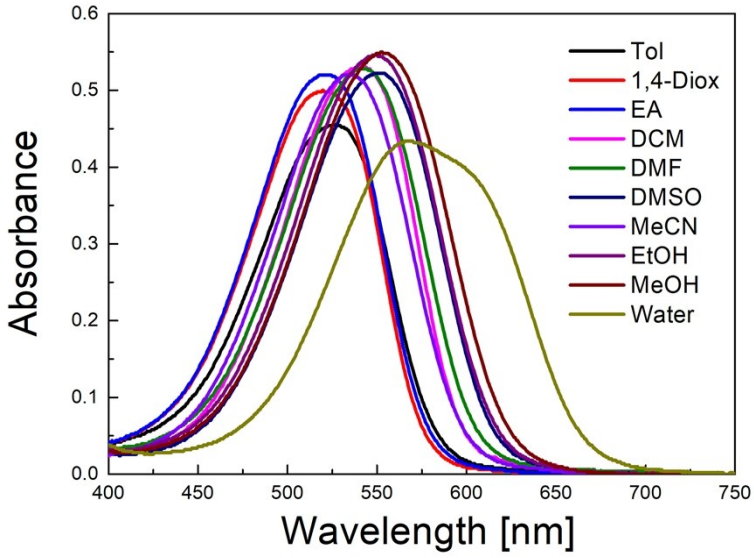


**Figure S1.** The absorption spectra of **NRTP** (10 μM) in various solvents.

**Table S1.** The volume of stock solutions used to prepare GUVs

| GUVs | $V_{[SM]}$ [μL] | $V_{[DPPG]}$ [μL] | $V_{[CL]}$ [μL] | $V_{[LE]}$ [μL] | $V_{[DOPG]}$ [μL] |
|---|---|---|---|---|---|
| SM | 50 | 50 | 10 | 0 | 0 |
| LE | 0 | 0 | 0 | 50 | 50 |
| LE + 10%CL | 0 | 0 | 5 | 50 | 50 |
| LE + 40%CL | 0 | 0 | 20 | 50 | 50 |

**Table S2.** The emission wavelength and quantum yield of NRTP in various solvents.

| Solvent | Polarity | Emission [nm] | Quantum Yield |
|---|---|---|---|
| Toluene | 33.9 | 605 | 0.242 |
| 1,4-Dioxane | 36.0 | 608 | 0.256 |
| EA | 38.1 | 610 | 0.236 |
| DCM | 40.7 | 620 | 0.188 |
| DMF | 43.2 | 651 | 0.141 |
| DMSO | 45.1 | 647 | 0.096 |
| MeCN | 45.6 | 631 | 0.193 |
| EtOH | 51.9 | 634 | 0.064 |
| MeOH | 55.4 | 645 | 0.069 |
| Water | 63.1 | 672 | 0.002 |

**Table S3.** The emission wavelength and quantum yield of NRTP in mixed solvents of water and 1,4-dioxane.

| Water fraction | Emission [nm] | Quantum Yield |
|---|---|---|
| 0% | 608 | 0.256 |
| 1% | 616 | 0.243 |
| 2% | 620 | 0.212 |
| 4% | 628 | 0.187 |
| 6% | 632 | 0.159 |
| 8% | 637 | 0.135 |
| 10% | 639 | 0.125 |
| 15% | 644 | 0.116 |
| 20% | 646 | 0.091 |
| 25% | 649 | 0.071 |
| 30% | 651 | 0.052 |
| 35% | 653 | 0.050 |
| 40% | 655 | 0.037 |
| 60% | 663 | 0.019 |
| 80% | 669 | 0.007 |
| 100% | 672 | 0.002 |

**Table S4.** The temperature of 5 mM **NRTP** in mixed solvent of DMSO and PBS buffer (v:v = 1:4) after irradiation by mercury lamp (200-800 nm) for different time.

| Irradiation time [min] | Temperature ($^{o}$C) |
|---|---|
| 0 | 20 |
| 5 | 40 |
| 10 | 45 |
| 15 | 48 |

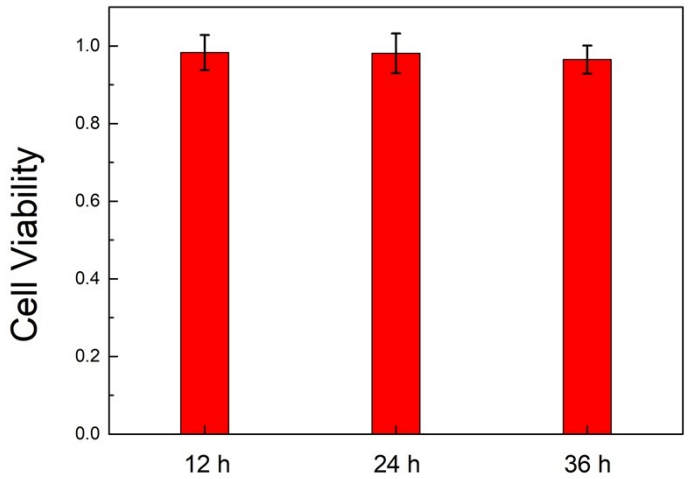


**Figure S2.** The cell viability of Hepg2 cells incubated by 5 μM **NRTP** for different time.

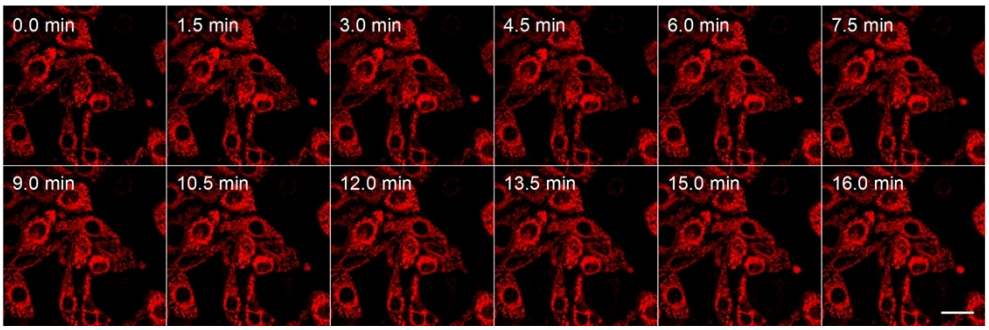


**Figure S3.** The fluorescence images of Hepg2 cells incubated by 5 μM **NRTP** under the ceaseless exposure to 561 nm laser for different time (0-16 min).

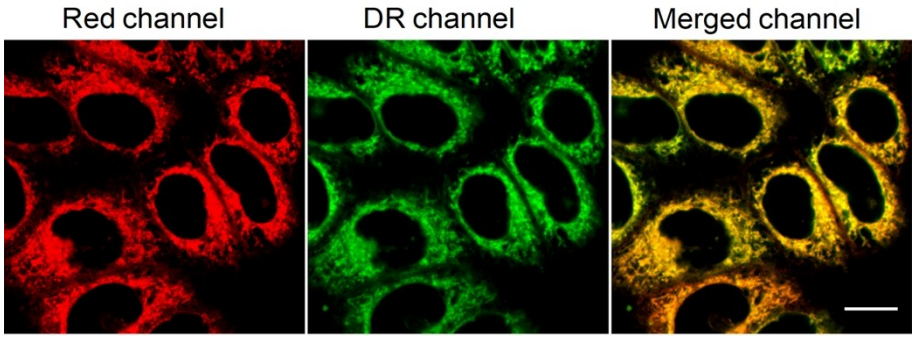


**Figure S4.** The fluorescent images of Hepg2 cells co-stained by 5 μM **NRTP** and 200 nM MTDR for 30 min, exposed by high-power 561 nm laser for 5 min, and then imaged under the excitation by low-power 561 nm laser (red channel, **NRTP**) and 647 nm laser (DR channel, MTDR). Bar = 20 μm.

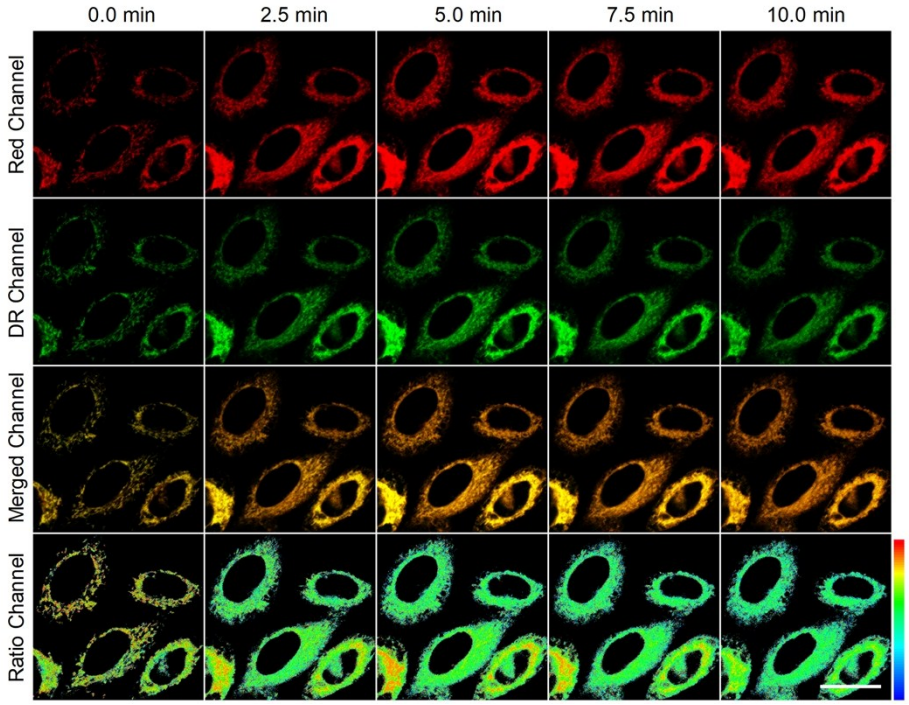


**Figure S5.** The fluorescent and ratiometric images of Hepg2 cells incubated by 5 μM NRTP then exposure to high-power 561 nm laser for different time (1-10 min). $\lambda_{ex}$ = 561 nm. Bar = 20 μm.

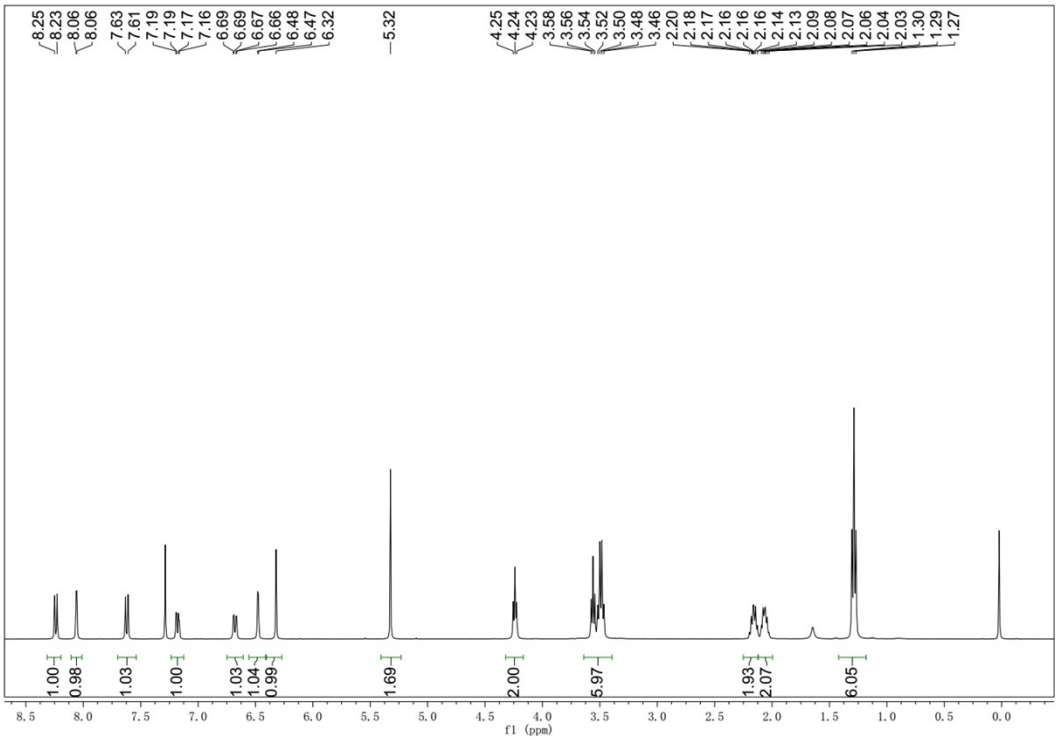

**Figure S6.** The $^{1}$H NMR spectra of **2**.

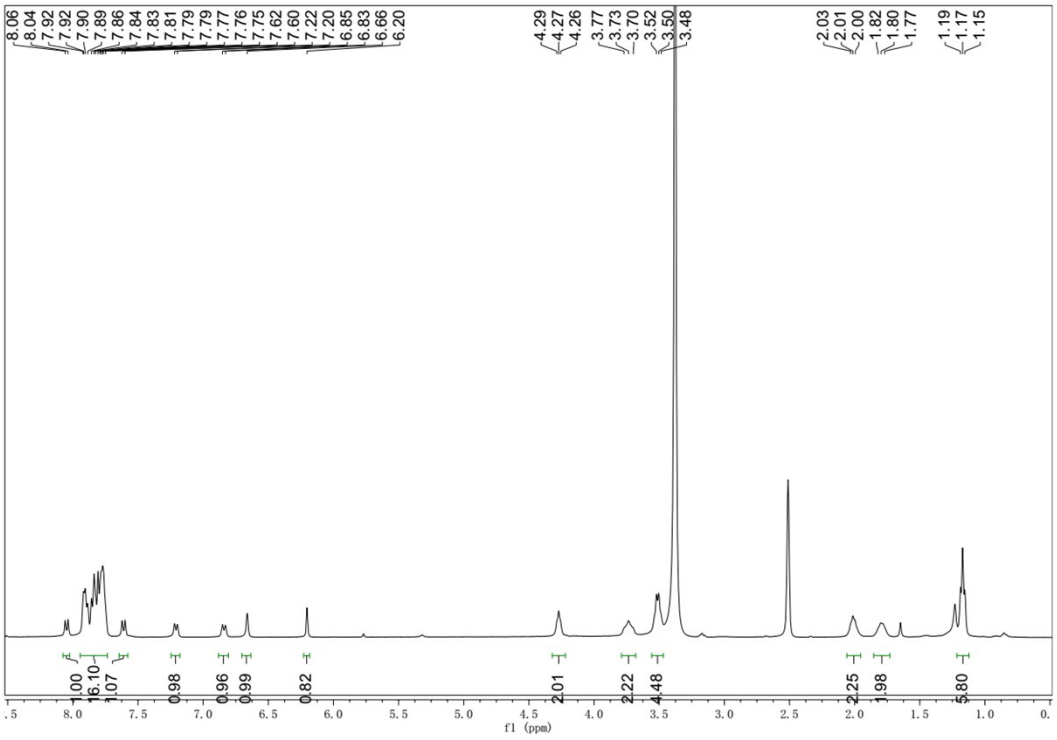

**Figure S7.** The $^{1}$H NMR spectra of **NRTP**.

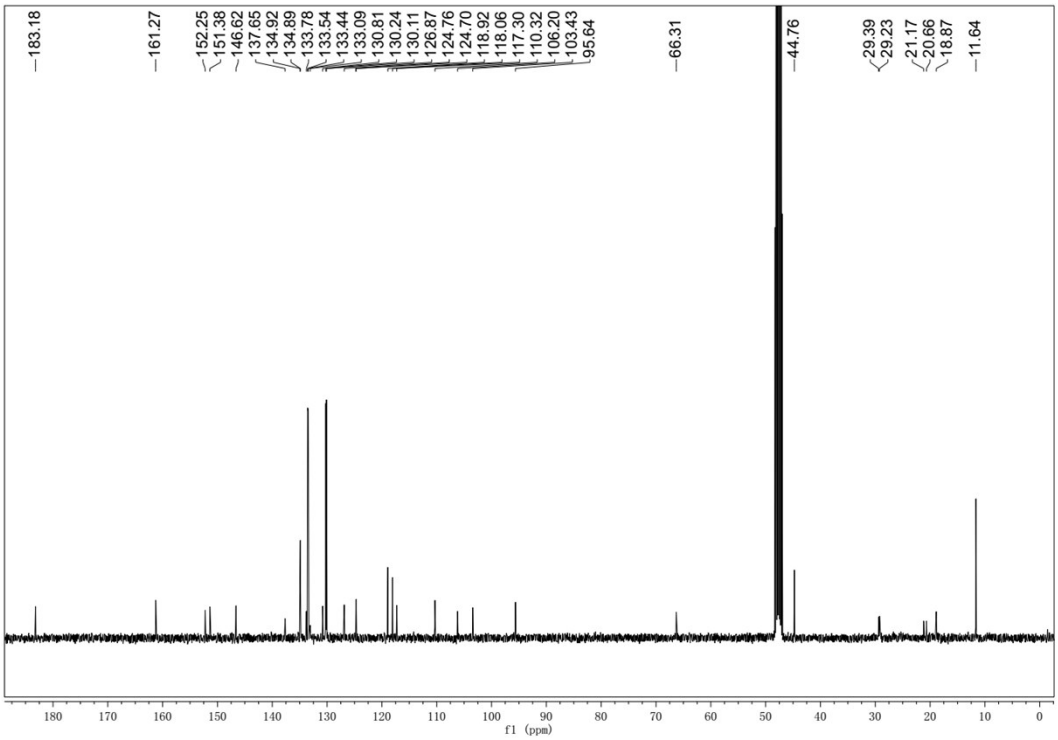


**Figure S8.** The $^{13}C$ NMR spectra of **NRTP**.

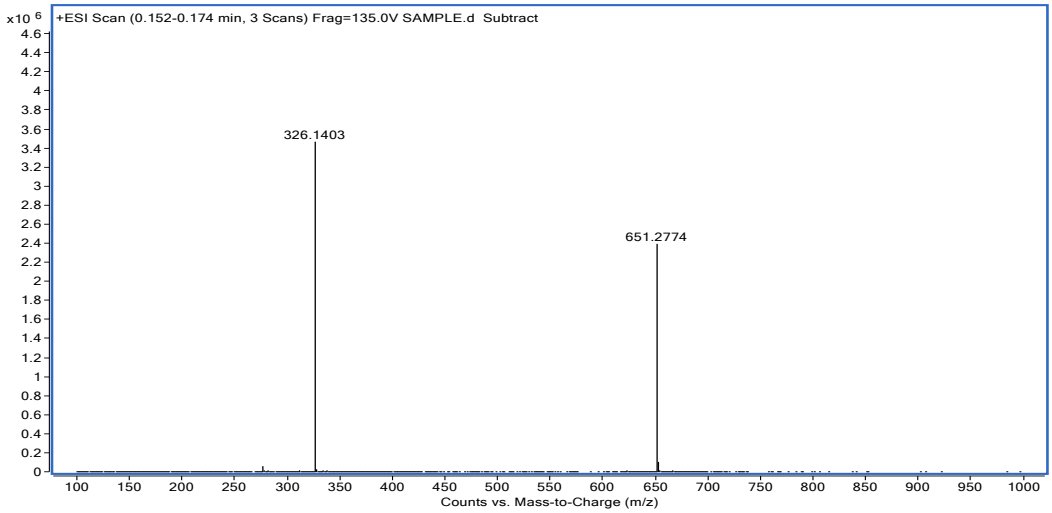


**Figure S9.** The HRMS spectra of **NRTP**.