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

Electronic Supplementary Information

Glutathione- and Light-Controlled Generation of Singlet Oxygen for Triggering Drug Release in Mesoporous Silica Nanoparticles

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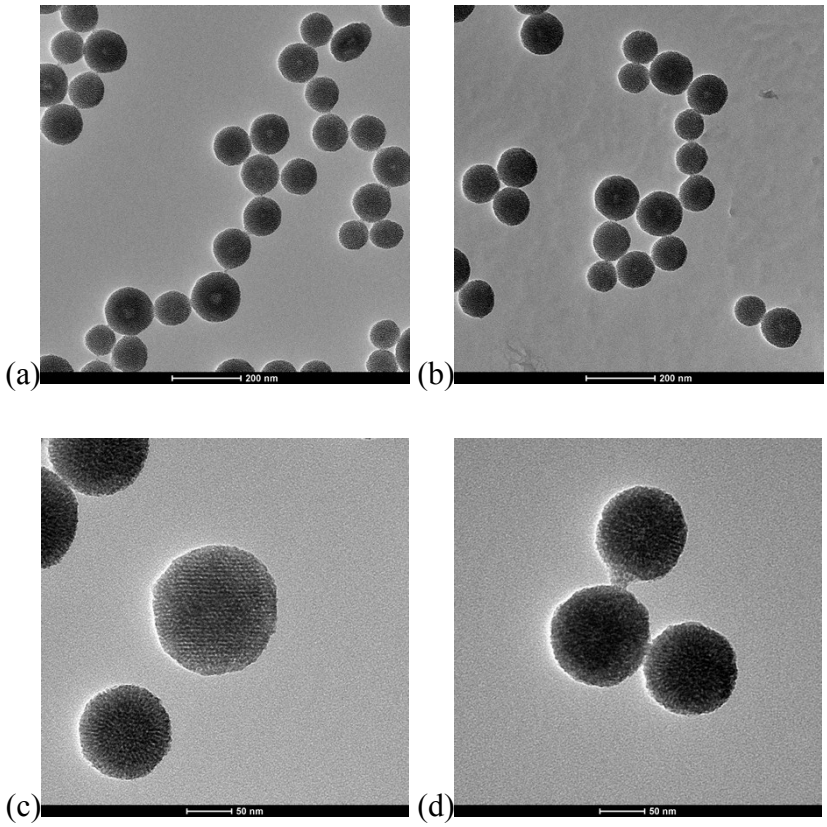
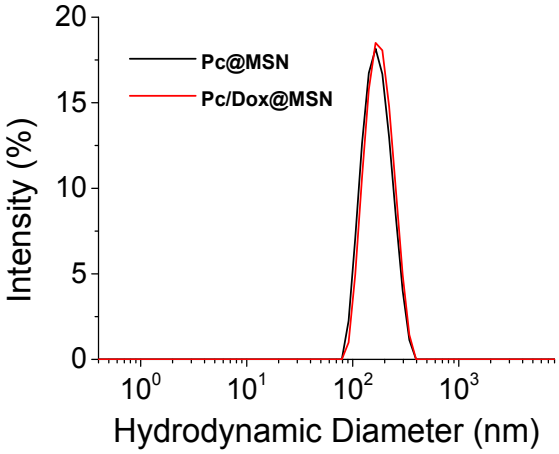


Fig. S1 TEM images of (a,c) **Pc@MSN** and (b,d) **Pc/Dox@MSN**. Scale bars denote 200 nm (a,b) or 50 nm (c,d).



MSN	Z-average D_h (nm)	PDI
Pc@MSN	164.7	0.13
Pc/Dox@MSN	175.6	0.14

Fig. S2 Hydrodynamic diameter (D_h) distribution of **Pc@MSN** (black) and **Pc/Dox@MSN** (red) in water as determined by DLS.

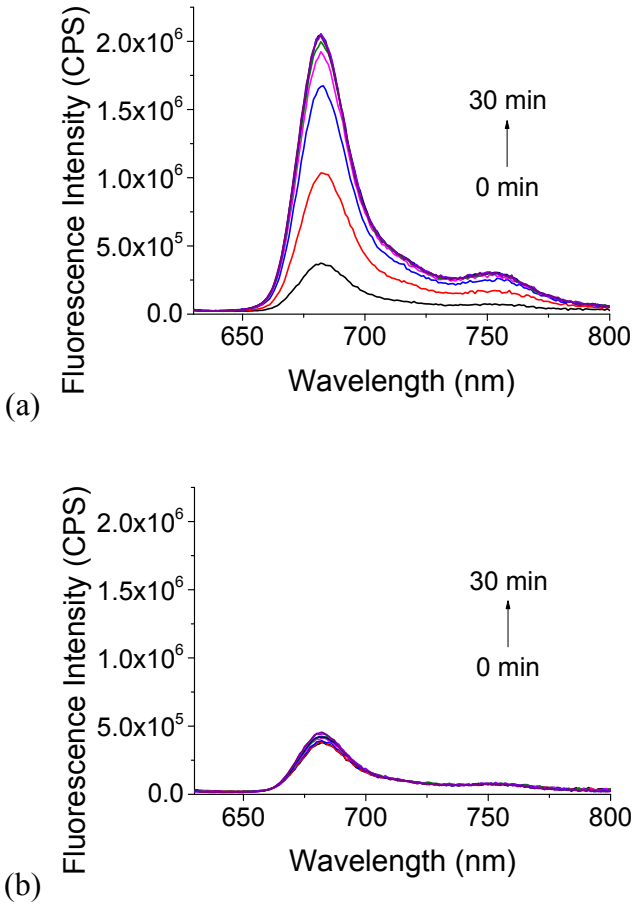
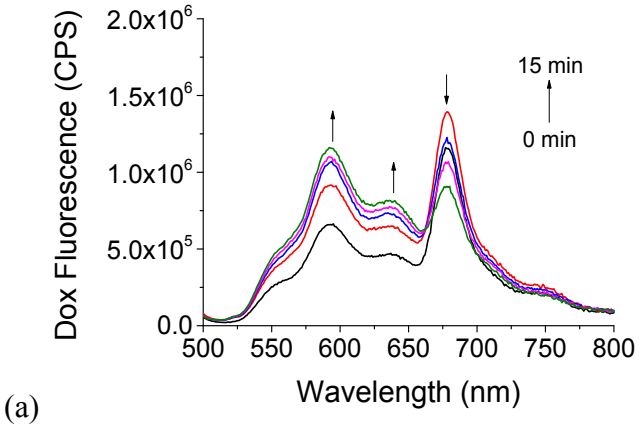
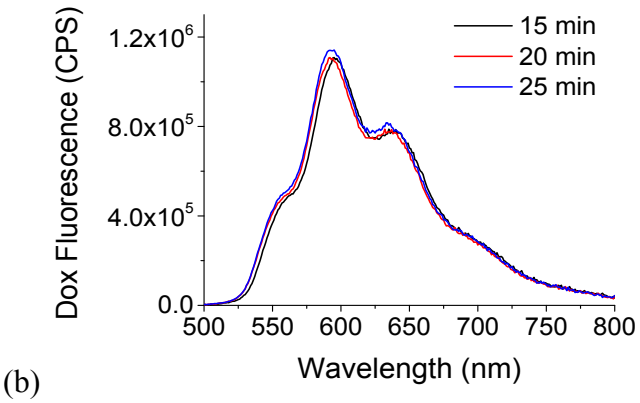


Fig. S3 Change in fluorescence spectrum (λ_{ex} = 610 nm) of **Pc/Dox@MSN** ([ZnPc] = 0.5 μM) upon incubation with (a) 5 mM or (b) 5 μM of GSH in PBS with 0.5% Tween 80 monitored over 30 min.



(a)



(b)

Fig. S4 (a) Fluorescence spectra (λ_{ex} = 485 nm) of **Pc/Dox@MSN** (0.331 mg MSN mL^{-1}) at different irradiation time after being incubated with 5 mM of GSH in DMF for 30 min. (b) Fluorescence spectra of the supernatant of the centrifuged samples after various irradiation time (λ > 610 nm, fluence rate = 40 mW cm^{-2}).

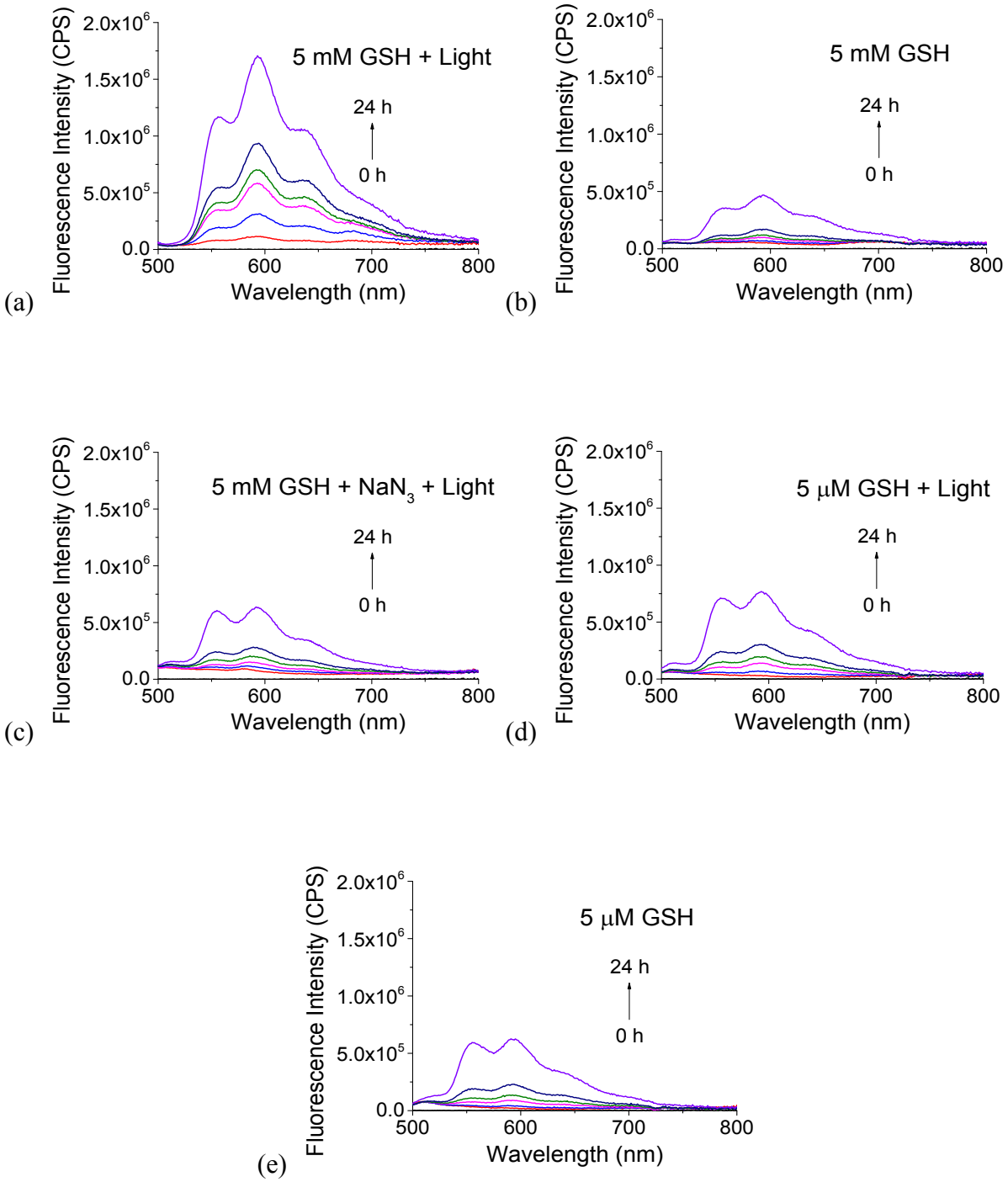


Fig. S5 Changes in fluorescence spectra (λ_{ex} = 485 nm) of the dialysates of **Pc/Dox@MSN** in PBS with 0.5% Tween 80 after incubation with (a-c) 5 mM or (d,e) 5 μM of GSH for 30 min (a,c,d) with or (b,e) without light irradiation (λ > 610 nm, fluence rate = 40 mW cm^{-2}) for 20 s, and then under ambient conditions for a period of 24 h. The control with (c) pre-incubation of

NaN_3 (200 mM) is also included. The amount of Dox in the MSNs was fixed at 10 nmol in all the solutions.

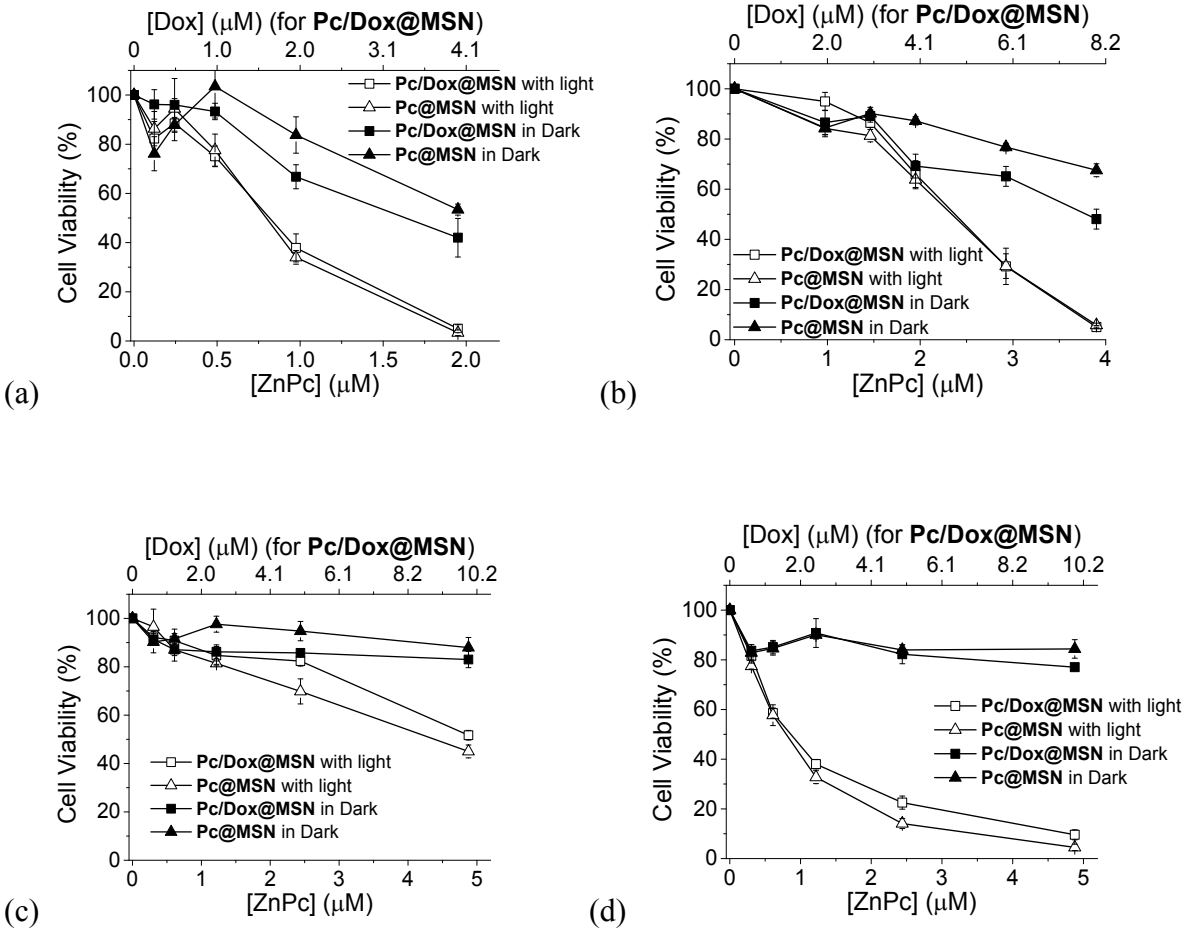
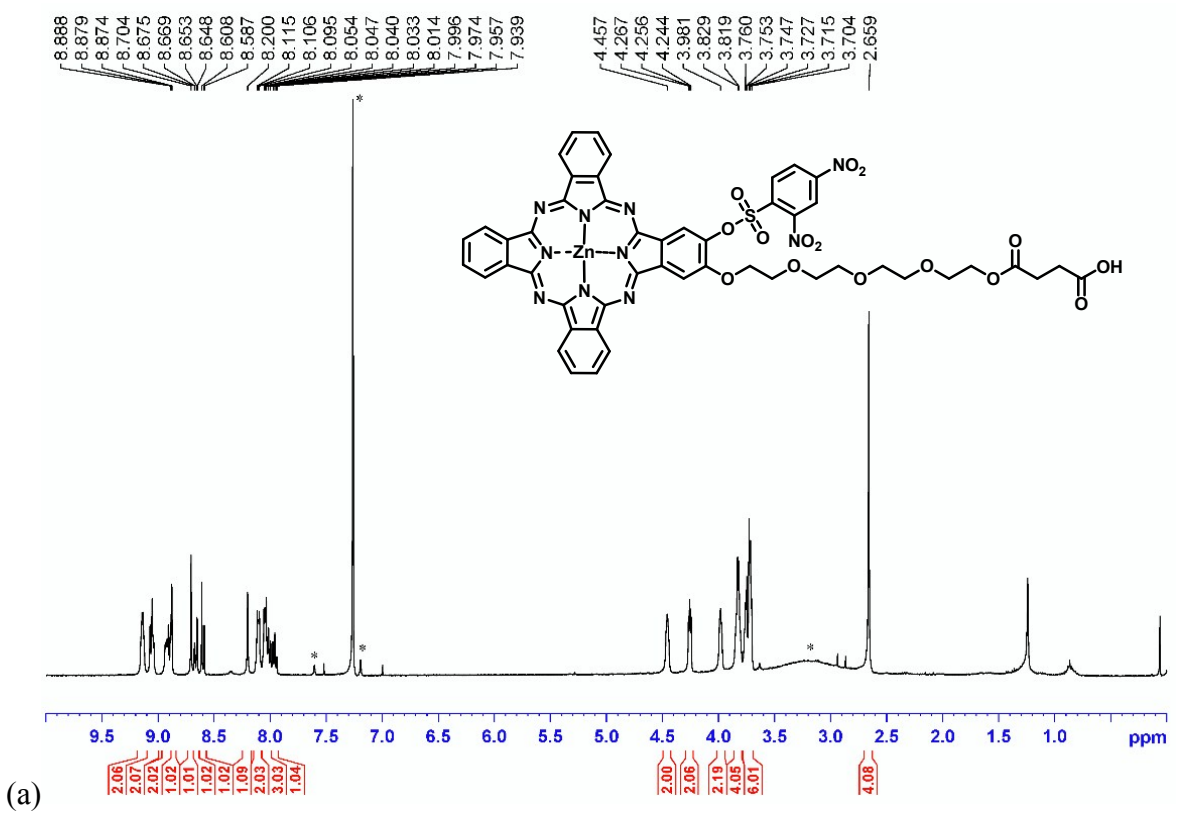


Fig. S6 Cytotoxic effects of **Pc@MSN** and **Pc/Dox@MSN** on HepG2 cells after being incubated for (a) 24 h, (b) 12 h, or (c, d) 6 h in the absence or presence of light for (a – c) 10 s or (d) 30 s ($\lambda > 610$ nm, fluence rate = 40 mW cm^{-2}). Data are expressed as the mean ± standard deviation, each performed in quadruplicate.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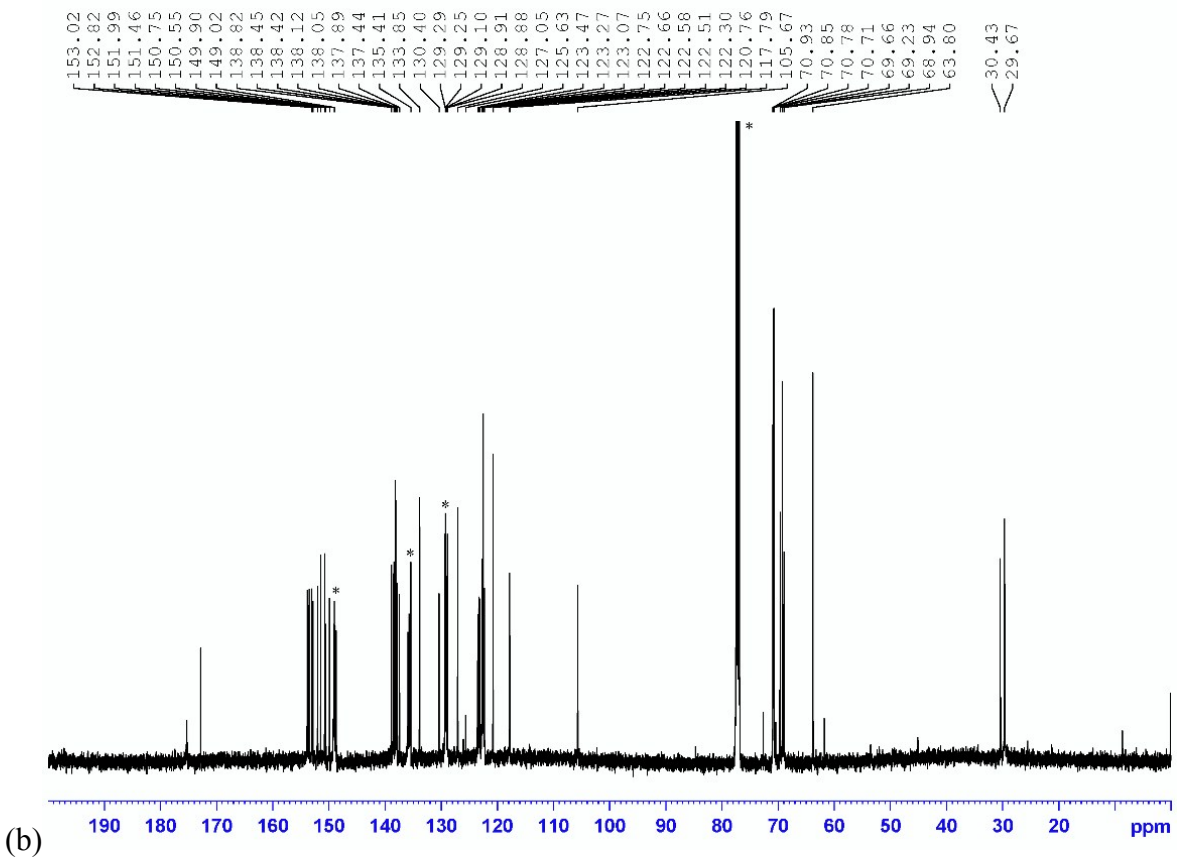
8.095
8.054
8.047
8.040
8.033
8.014
7.996
7.974
7.957
7.939
4.457
4.267
4.256
4.244
3.981
3.829
3.819
3.760
3.753
3.747
3.727
3.715
3.704
2.659
NO2
NO2
OH
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 ppm
2.06 2.07 2.02 1.02 1.01 1.02 1.02 1.09 2.03 3.03 1.04
2.00 2.06 2.19 4.05 6.01
4.08

(a)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138.45
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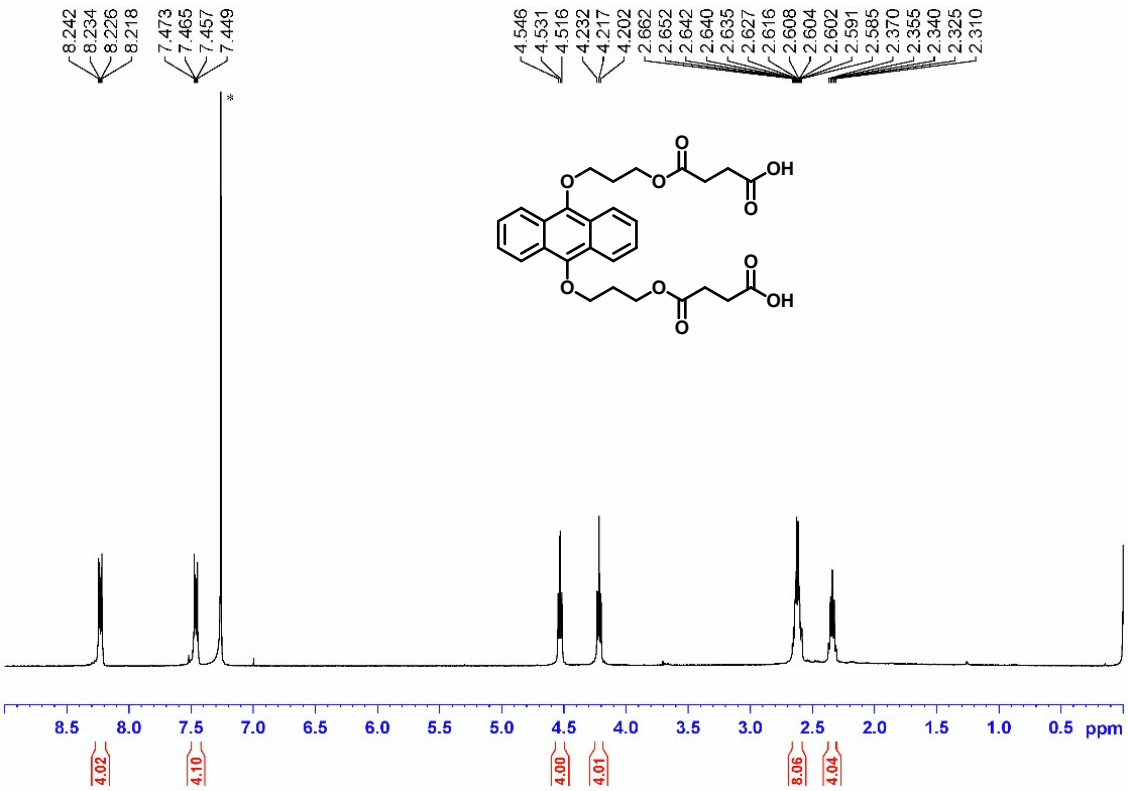
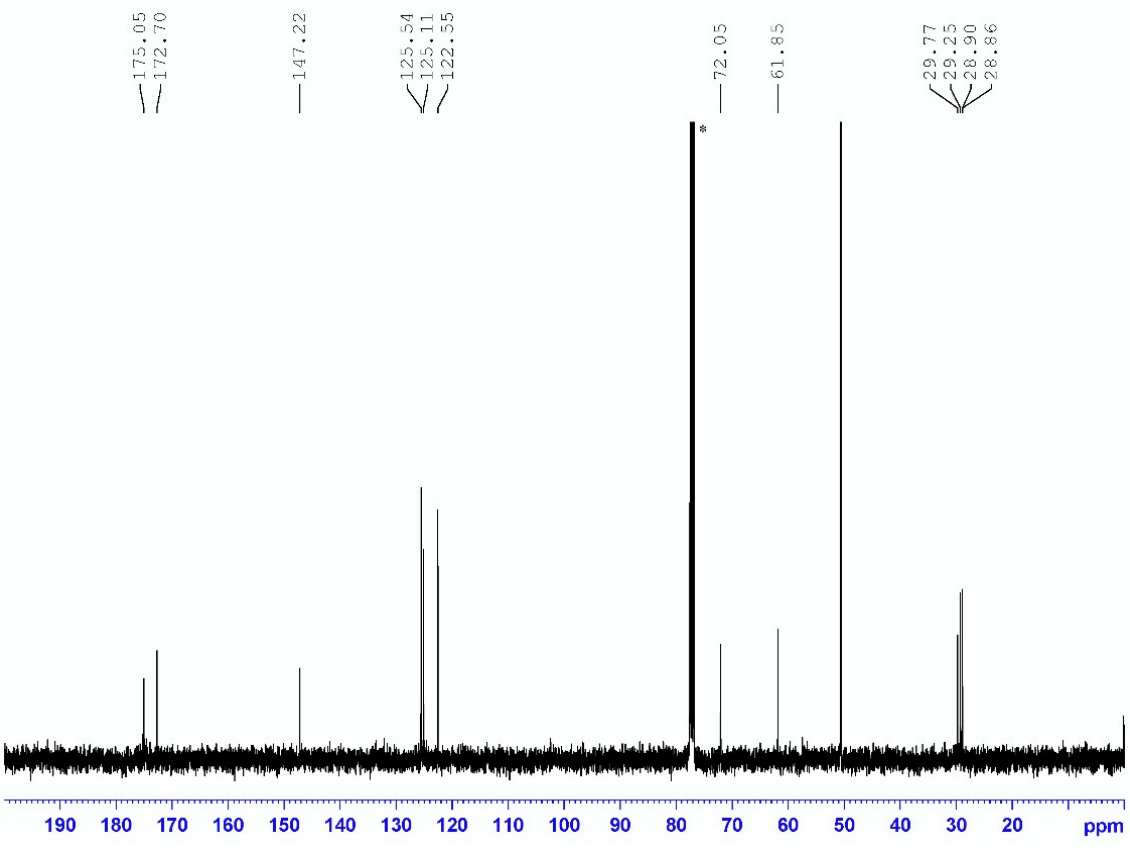
138.05
137.89
137.44
135.41
133.85
130.40
129.29
129.25
129.10
128.91
128.88
127.05
125.63
123.47
123.27
123.07
122.75
122.66
122.58
122.51
122.30
120.76
117.79
105.67
70.93
70.85
70.78
70.71
69.66
69.23
68.94
63.80
30.43
29.67
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 ppm

(b)

Fig. S7 (a) ^{1}H and (b) $^{13}C\{^{1}H\}$ NMR spectra of **2** in $CDCl_3$ with a trace amount of pyridine-d_5.

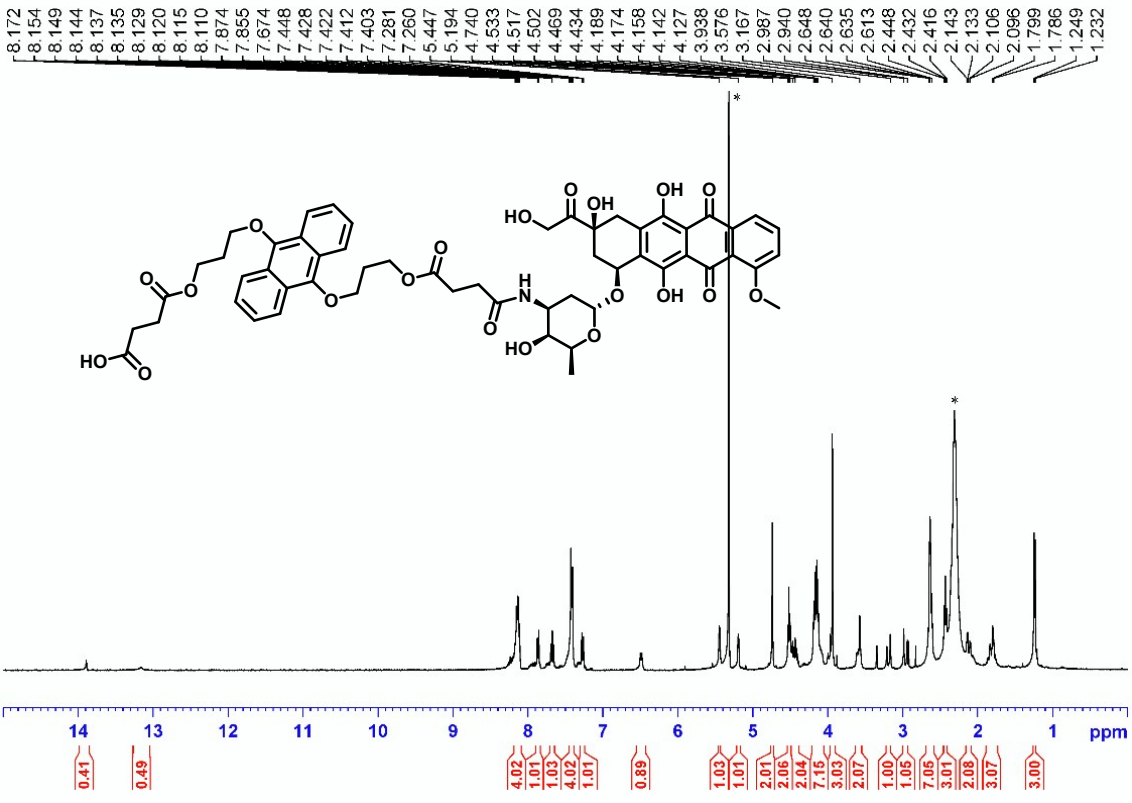
(a)



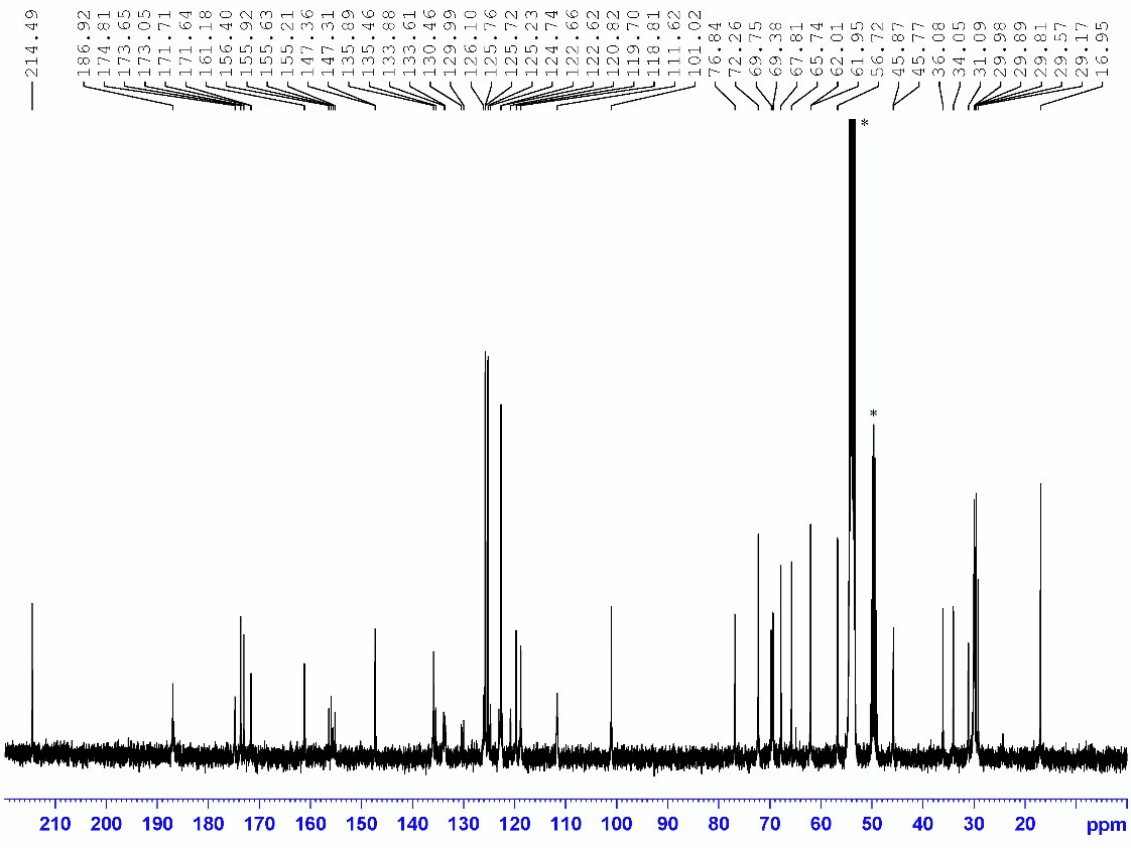


(b)

Fig. S8 (a) ^{1}H and (b) $^{13}C\{^{1}H\}$ NMR spectra of **4** in $CDCl_3$.



(a)



(b)

Fig. S9 (a) ^{1}H and (b) $^{13}C\{^{1}H\}$ NMR spectra of **5** in CD_2Cl_2 with a trace amount of CD_3OD.