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

Supplementary data

A rhodamine B-based lysosomal pH probe

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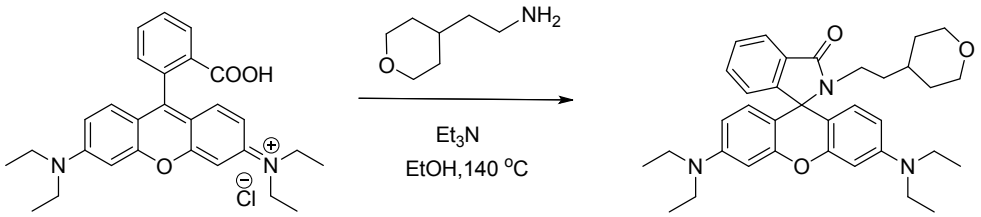
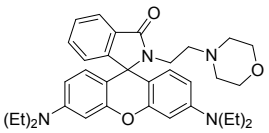
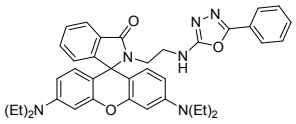
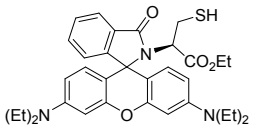
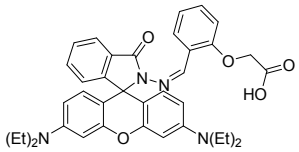
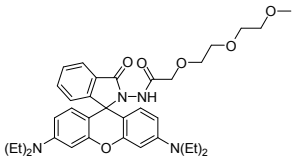
1. Synthesis of compound **R1**.



Scheme S1. Synthesis of compound **R1**

Rhodamine B (0.153 g, 0.32 mmol), 4-(2-aminoethyl)tetrahydropyran (0.074 g, 0.57 mmol) and Et_3N (0.101 g, 1 mmol) were dissolved in ethanol (5 mL), and the reaction mixture was stirred at 140 ℃ for 60 h. After the solution was cooled to room temperature, the solution was concentrated under reduced pressure and the residue was purified by column chromatography (Petroleum ether/Ethyl acetate = 1/1, v/v) to afford a white solid **R1** in 41% yield. Mp: 58-61 ℃. IR (KBr), ν/cm^{-1}: 2968, 2926, 1689, 1613, 1514, 1266, 1223, 1117, 1015, 788. ^{1}H NMR (DMSO, 300 MHz), δ: 0.75-1.00 (m, 4H, CH(CH_2CH$_2$)$_2$O), 1.08 (t, 12H, J = 6.9 Hz, NCH$_2$$CH_3$), 1.23-1.28 (m, 3H, CH_2CH(CH$_2$CH$_2$)$_2$O,), 2.95-3.10 (m, 4H, (CH$_2$$CH_2$)$_2$O), 3.32 (q, 8H, J = 6.9 Hz, NCH_2CH$_3$), 3.62-3.66 (m, 2H, CONCH_2CH$_2$), 6.26-6.38 (m, 6H, Xanthene-H), 7.04-7.09 (m, 1H, ArH), 7.48-7.55 (m, 2H, ArH), 7.76-7.79 (m, 1H, ArH); ^{13}C NMR (DMSO, 75 MHz), δ: 166.64, 152.90, 152.77, 148.33, 132.51, 131.09, 128.50, 128.28, 123.66, 122.12, 108.14, 105.26, 97.12, 66.79, 63.98, 43.66, 36.57, 34.53, 32.27, 31.34, 12.31; HRMS calcd for $C_{35}H_{44}N_3O_3$ $[M+H]^+$: 554.3383, found: 554.3383.

2. Table S1. The properties of **RML** and other pH probes.

Probes	In vitro				Cell experiment		Reference
	Probe concentration	Solvent	Emission intensity increase	Response time	Probe concentration	Incubation time	
	1 μM	DMSO：buffer = 1:99 (v:v)	80-fold	1.5 min	2.5 μM	1h	This work
	10 μM	EtOH：buffer = 1:9 (v:v)	46-fold	About 1 min	3 μM	12h	32
	10 μM	EtOH：buffer = 1:4 (v:v)	150-fold	5 min	5 μM	3h	33
	10 μM	EtOH：buffer = 1:9 (v:v)	20-fold	About 2 min	0.5 μM	12h	37
	10 μM	DMSO：buffer = 0.33:99.67 (v:v)	50-fold	several seconds	10 μM	0.5 h	14