

Supporting Information

Synthesis, surface activities, and aggregation behavior of phenyl- containing carboxybetaine surfactants

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1. ^1H and ^{13}C NMR spectra of C_nOBCb with $n=12, 14, 16, 18$ and main intermediates.

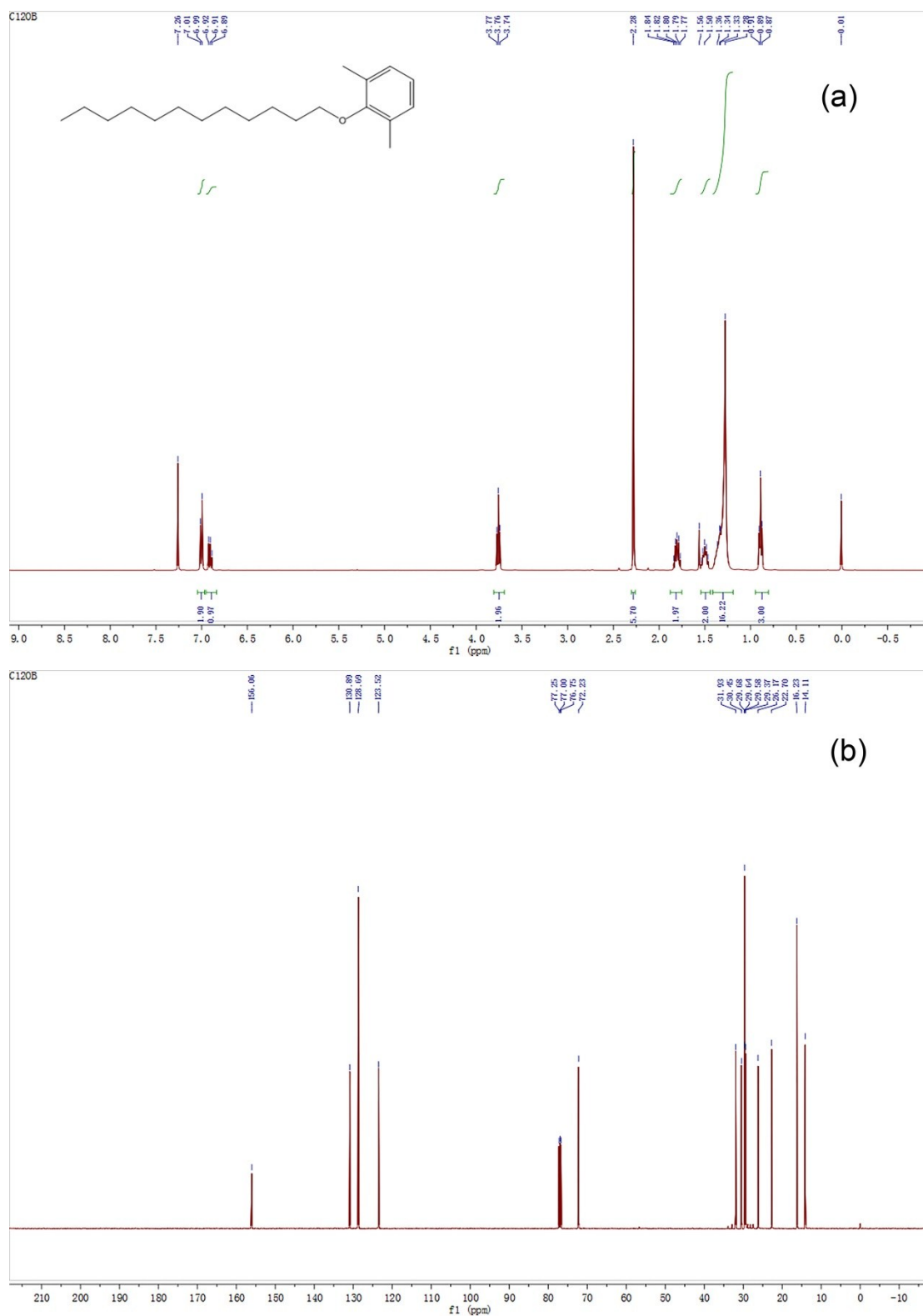


Fig. S1. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-(dodecyloxy)-1,3-dimethylbenzene (C_{12}OB) in CDCl_3 .

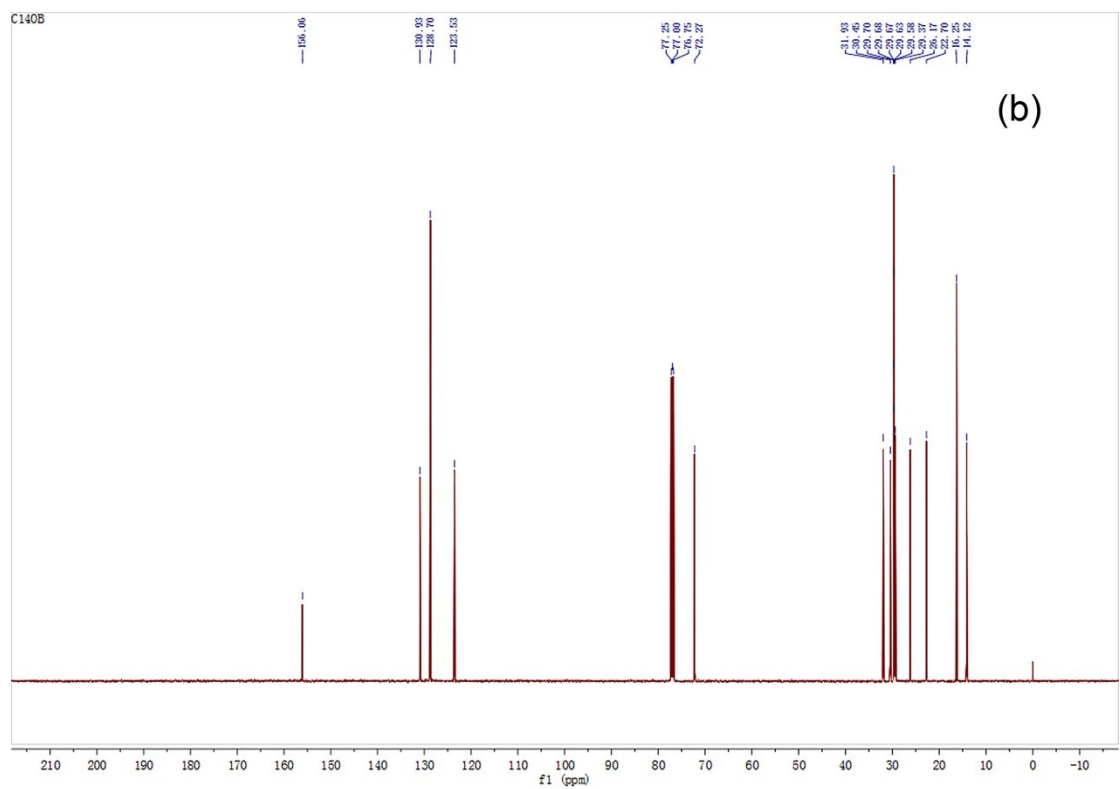
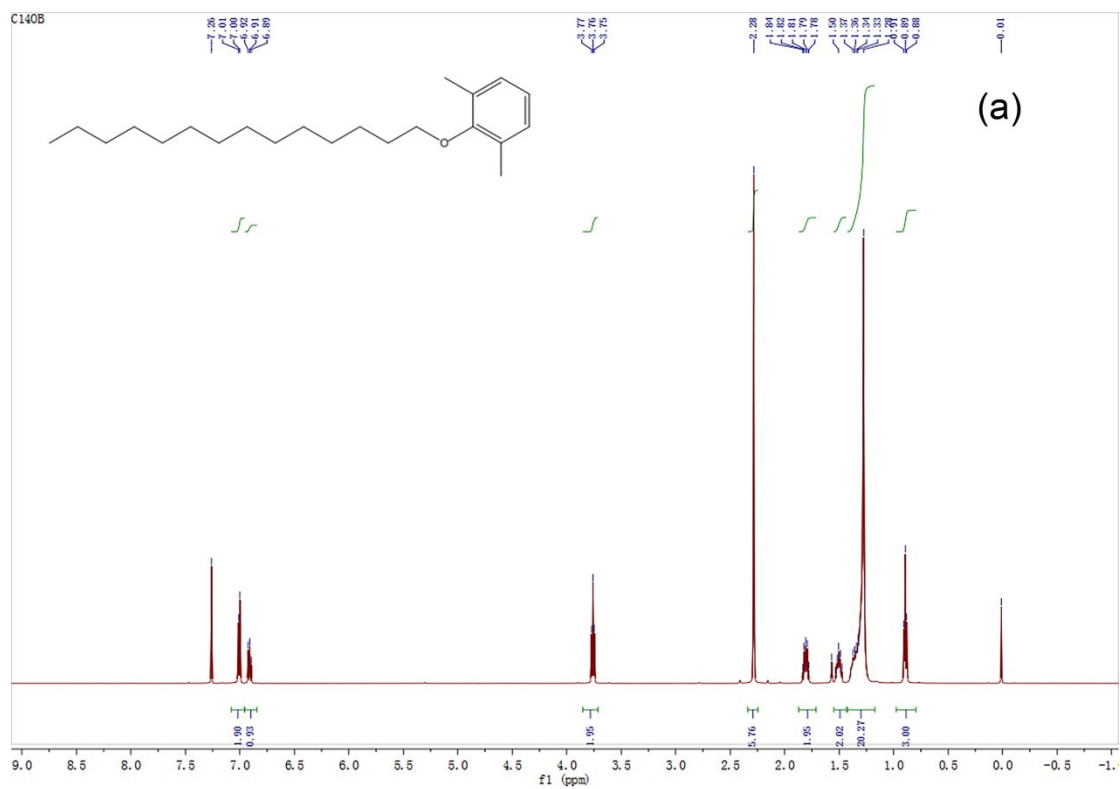


Fig. S2. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-(tetradecyloxy)-1,3-dimethylbenzene (C_{14}OB) in CDCl_3 .

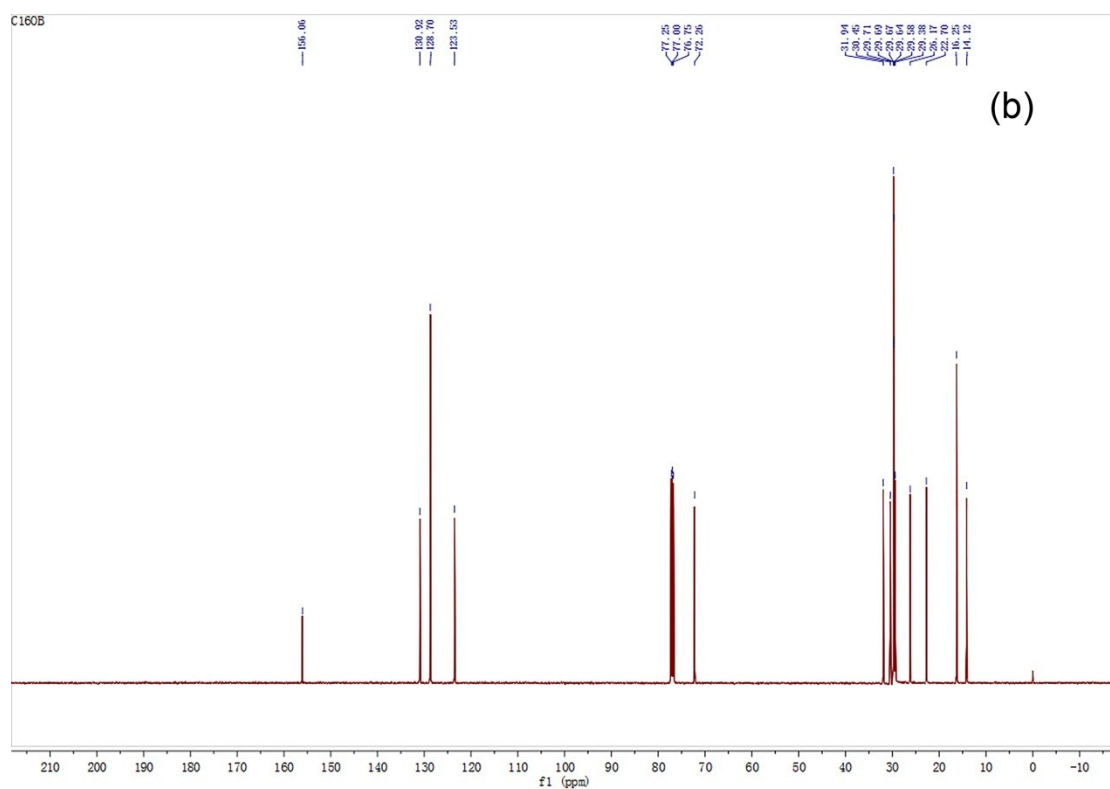
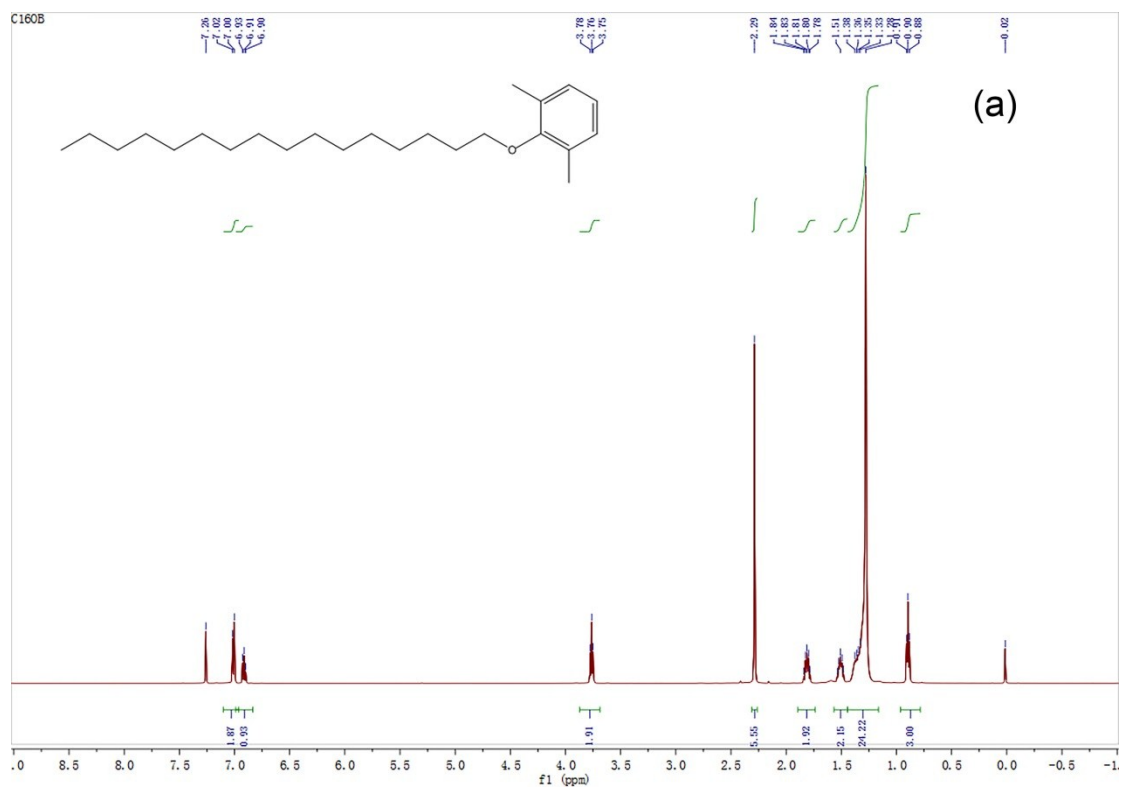


Fig. S3. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-(hexadecyloxy)-1,3-dimethylbenzene (C_{16}OB) in CDCl_3 .

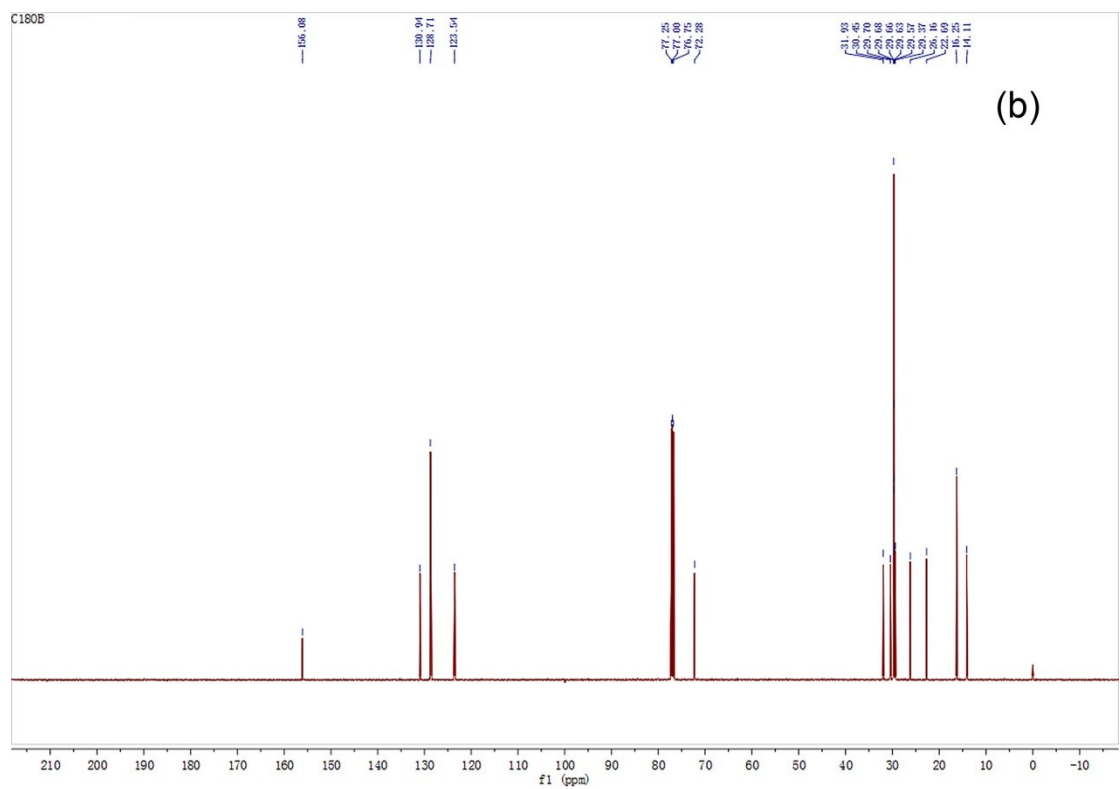
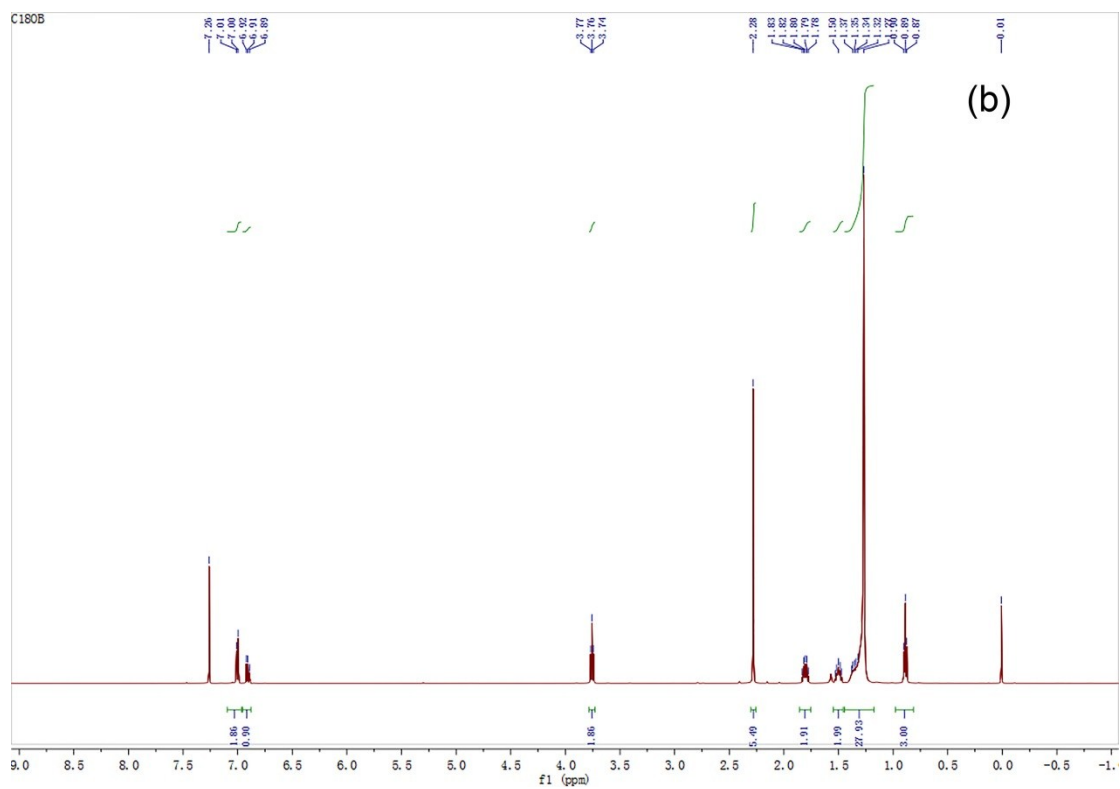


Fig. S4. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-(octadecyloxy)-1,3-dimethylbenzene (C_{18}OB) in CDCl_3 .

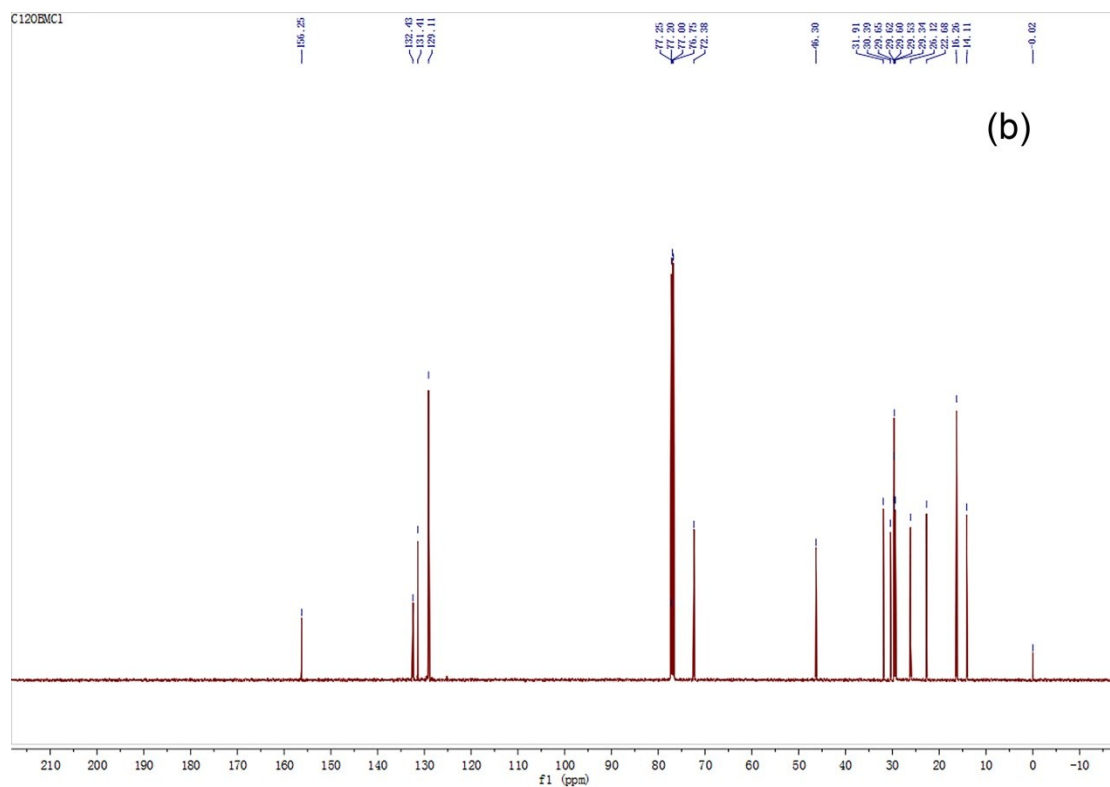
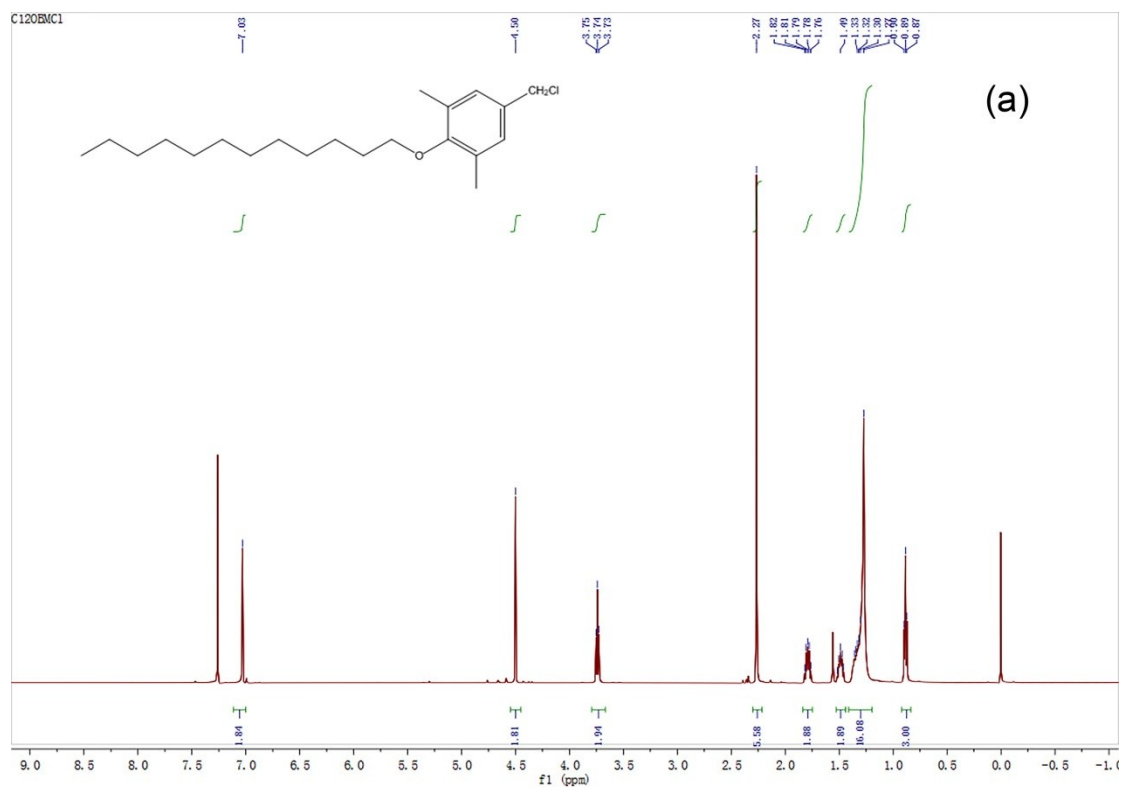


Fig. S5. ^1H NMR (a) and ^{13}C NMR (b) spectra of 5-(chloromethyl)-2-(dodecyloxy)-1,3-dimethylbenzene ($\text{C}_{12}\text{OBMC1}$) in CDCl_3 .

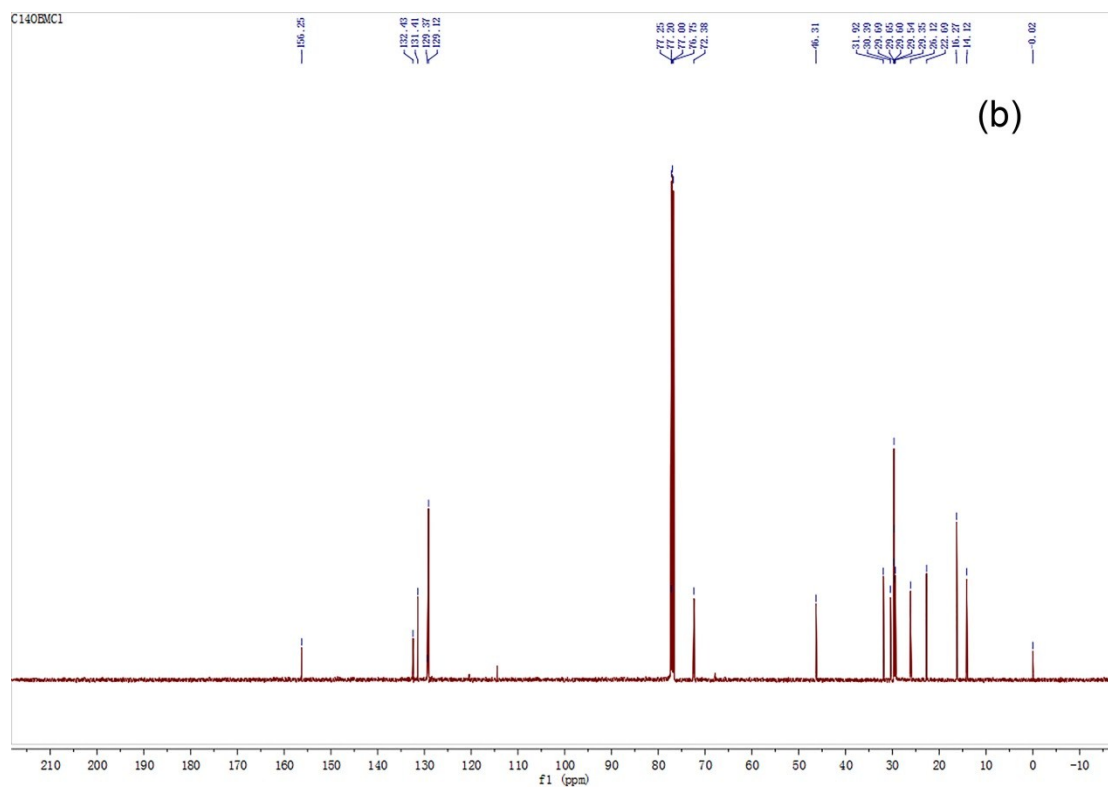
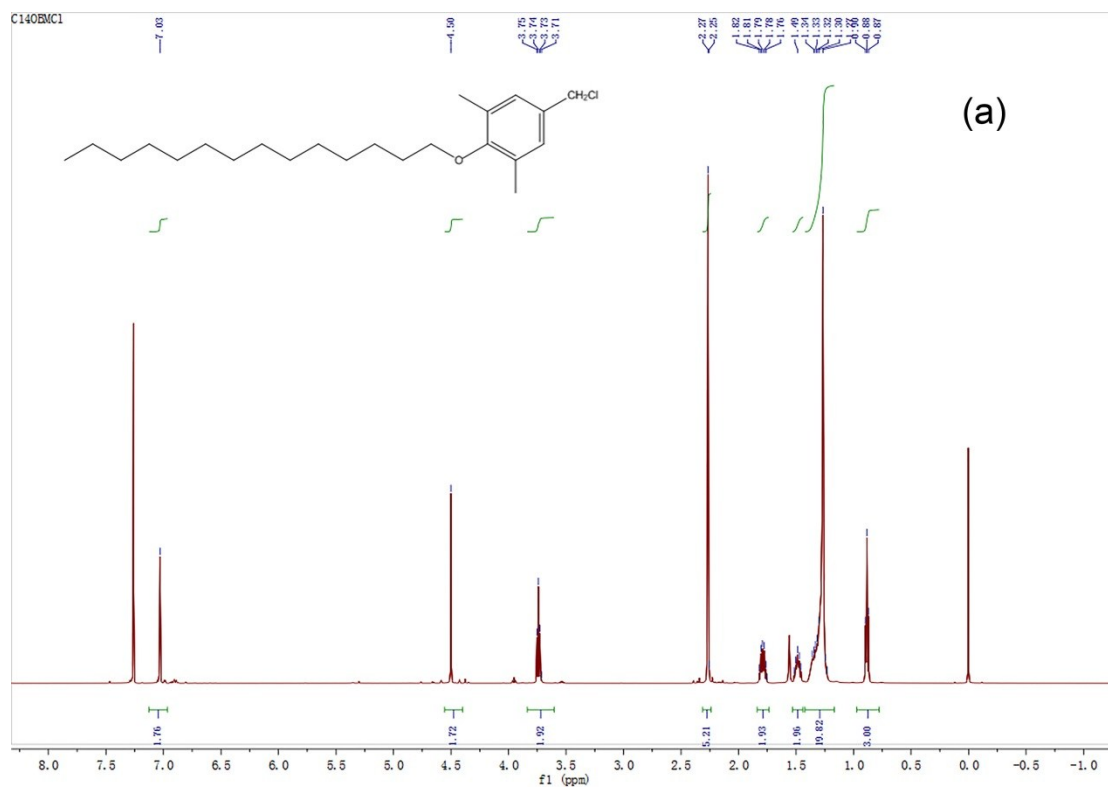


Fig. S6. ^1H NMR (a) and ^{13}C NMR (b) spectra of 5-(chloromethyl)-2-(tetradecyloxy)-1,3-dimethylbenzene ($\text{C}_{14}\text{OBMC1}$) in CDCl_3 .

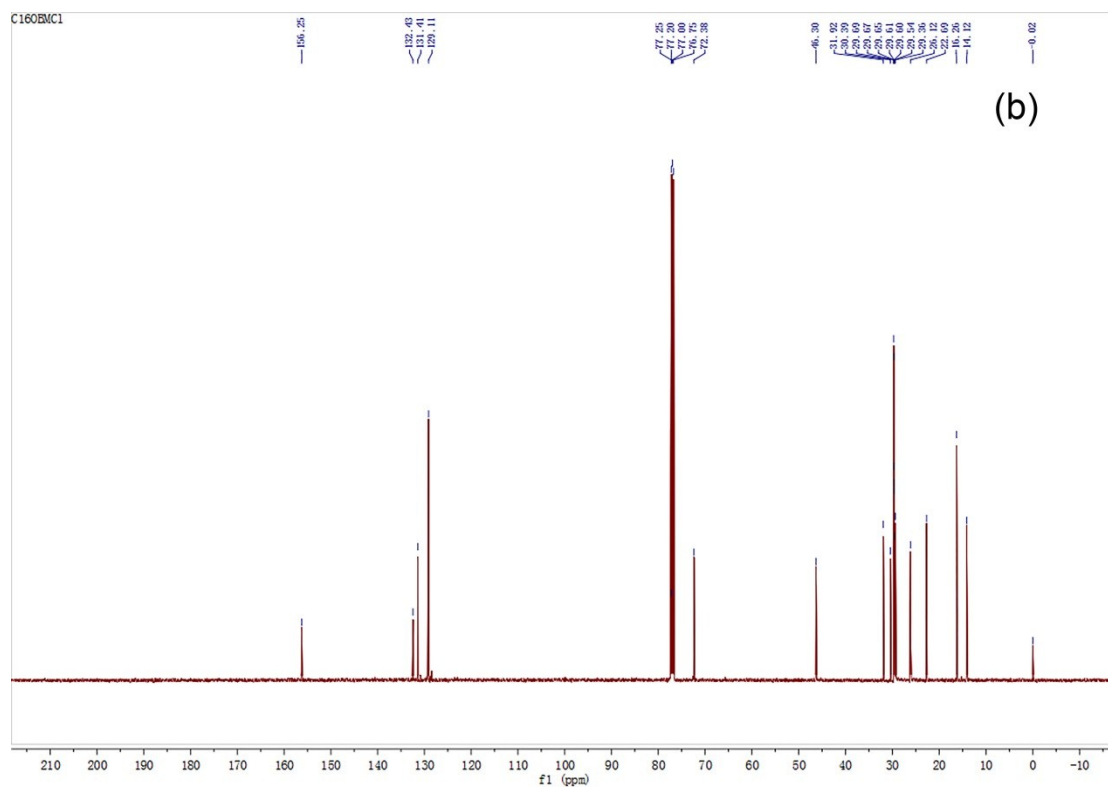
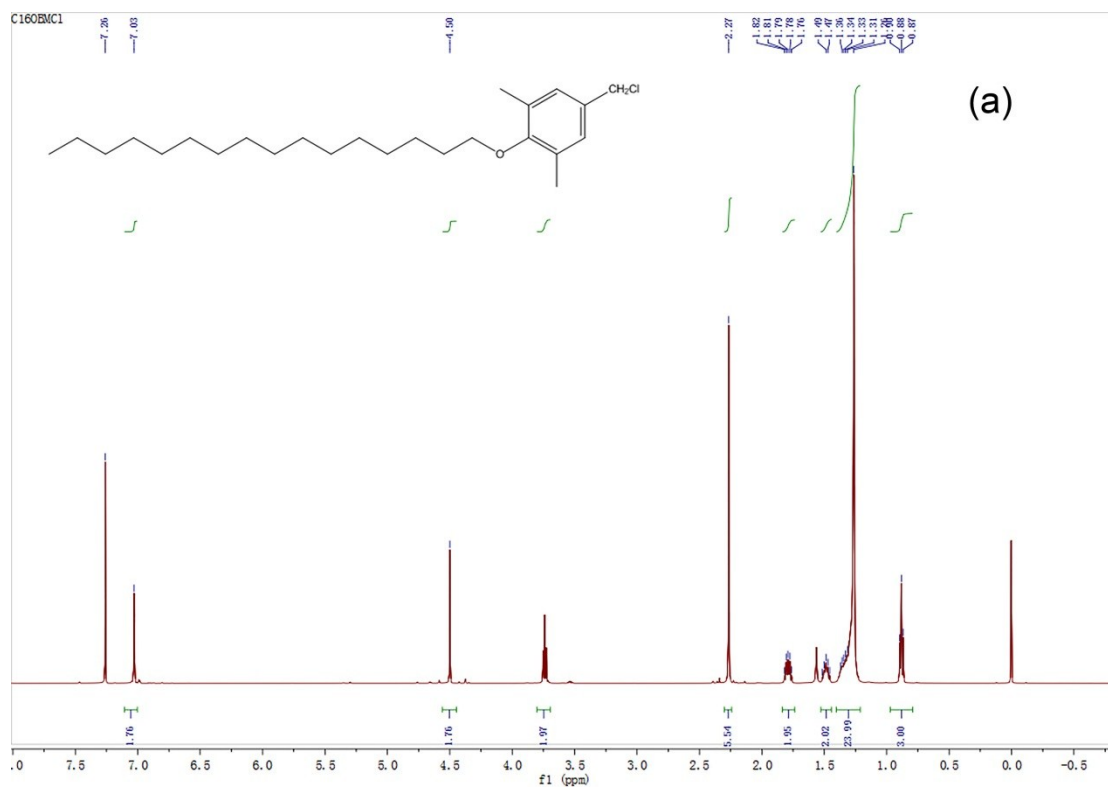


Fig. S7. ^1H NMR (a) and ^{13}C NMR (b) spectra of 5-(chloromethyl)-2-(hexadecyloxy)-1,3-dimethylbenzene ($\text{C}_{16}\text{OBMC1}$) in CDCl_3 .

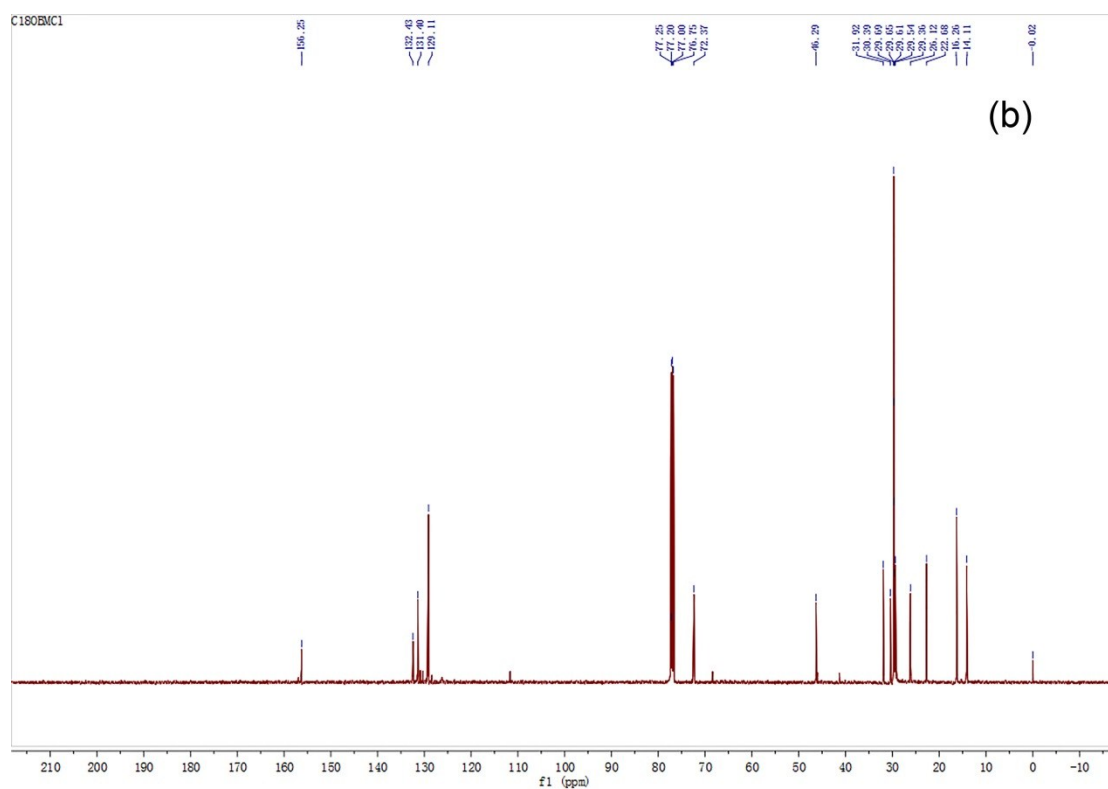
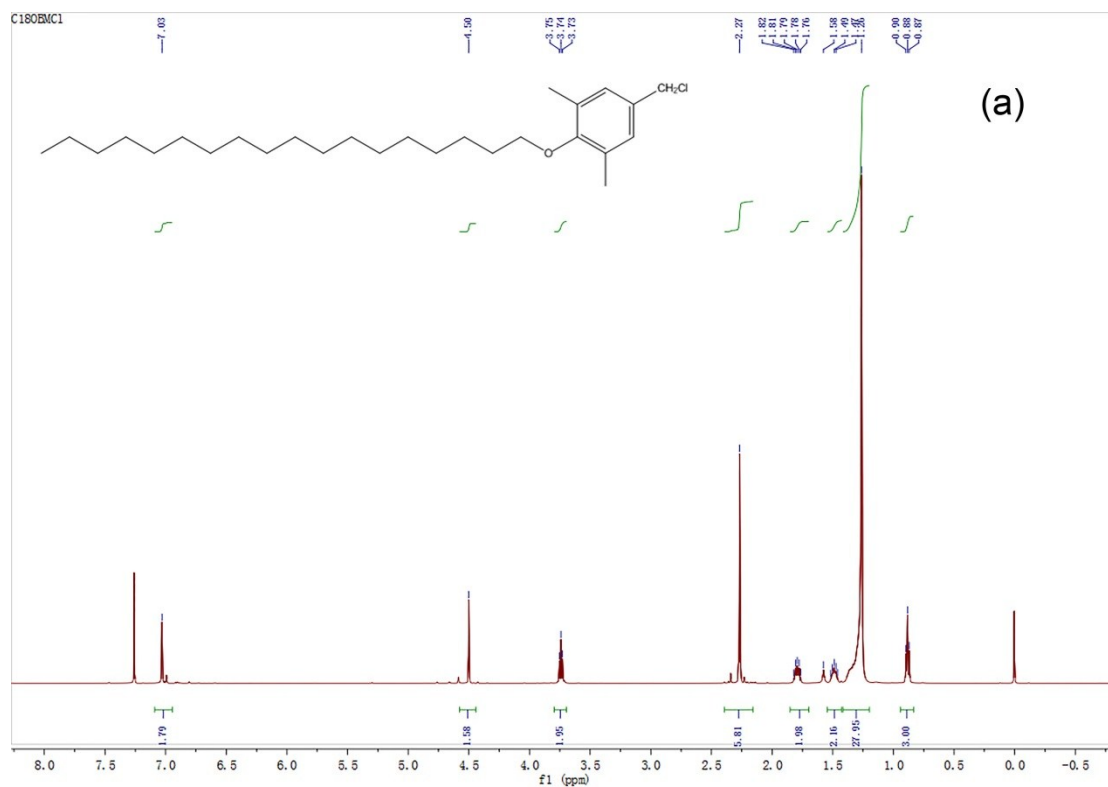


Fig. S8. ^1H NMR (a) and ^{13}C NMR (b) spectra of 5-(chloromethyl)-2-(octadecyloxy)-1,3-dimethylbenzene($\text{C}_{18}\text{OBMCl}$) in CDCl_3 .

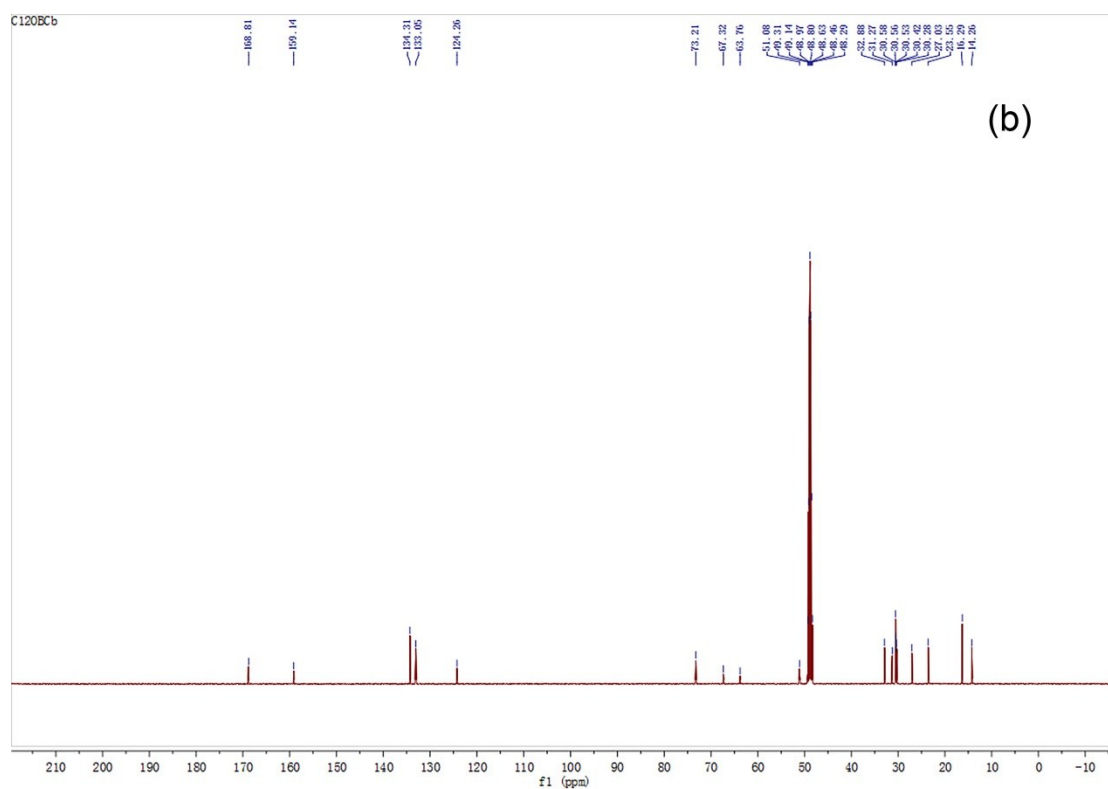
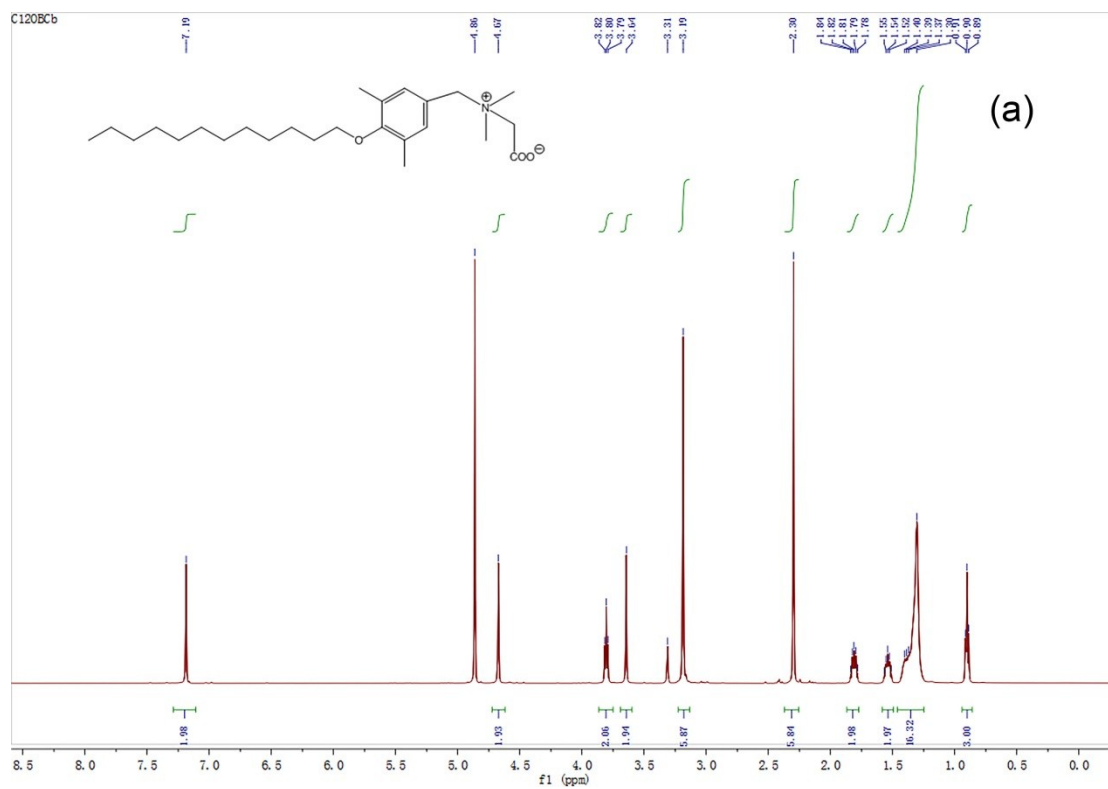


Fig. S9. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-((4-(dodecyloxy)-3,5-dimethylbenzyl)-dimethylammonio)acetate (C_{12}OBCb) in CD_3OD .

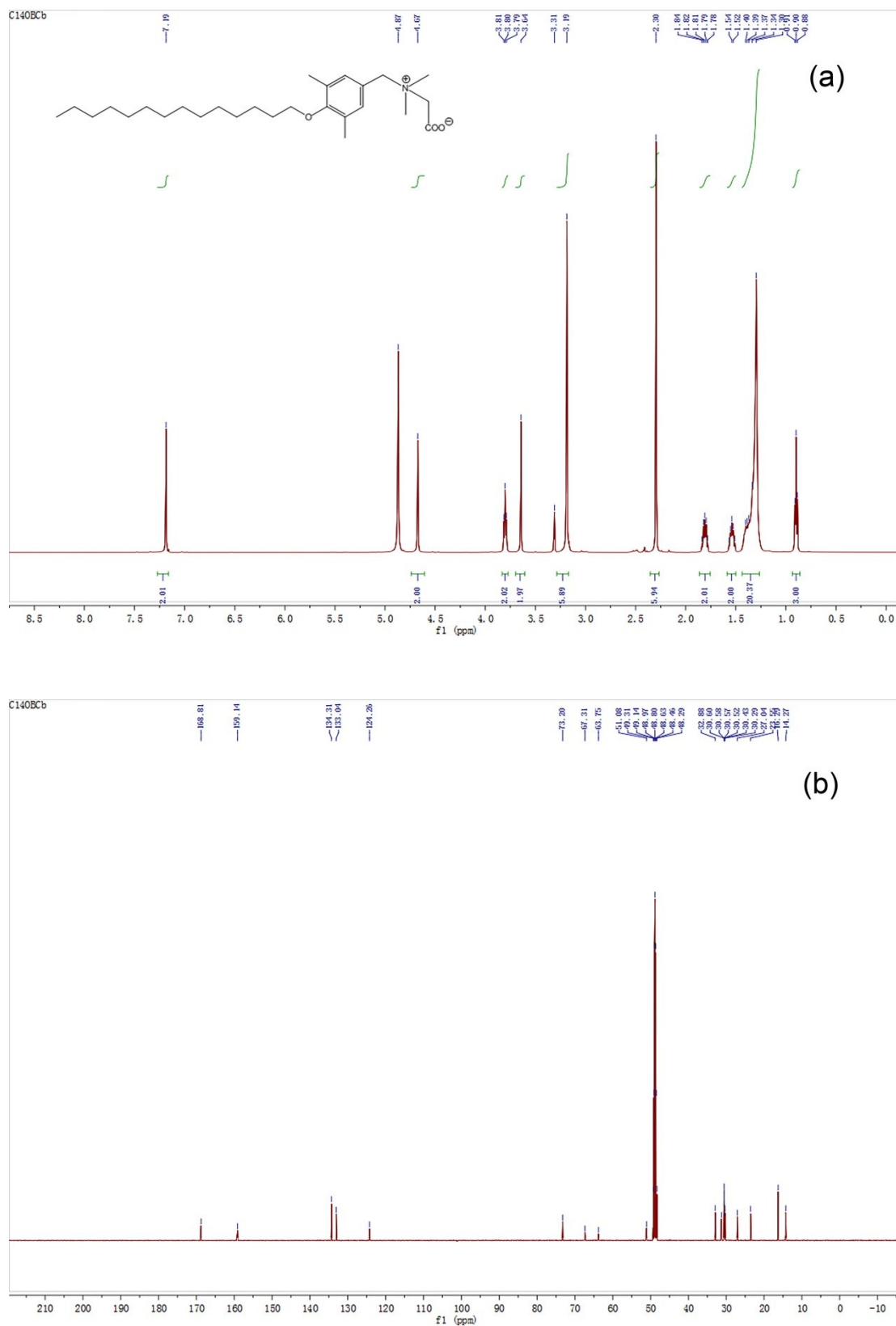


Fig. S10. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-((4-(tetradecyloxy)-3,5-dimethylbenzyl)-dimethylammonio)acetate (C_{14}OBCb) in CD_3OD .

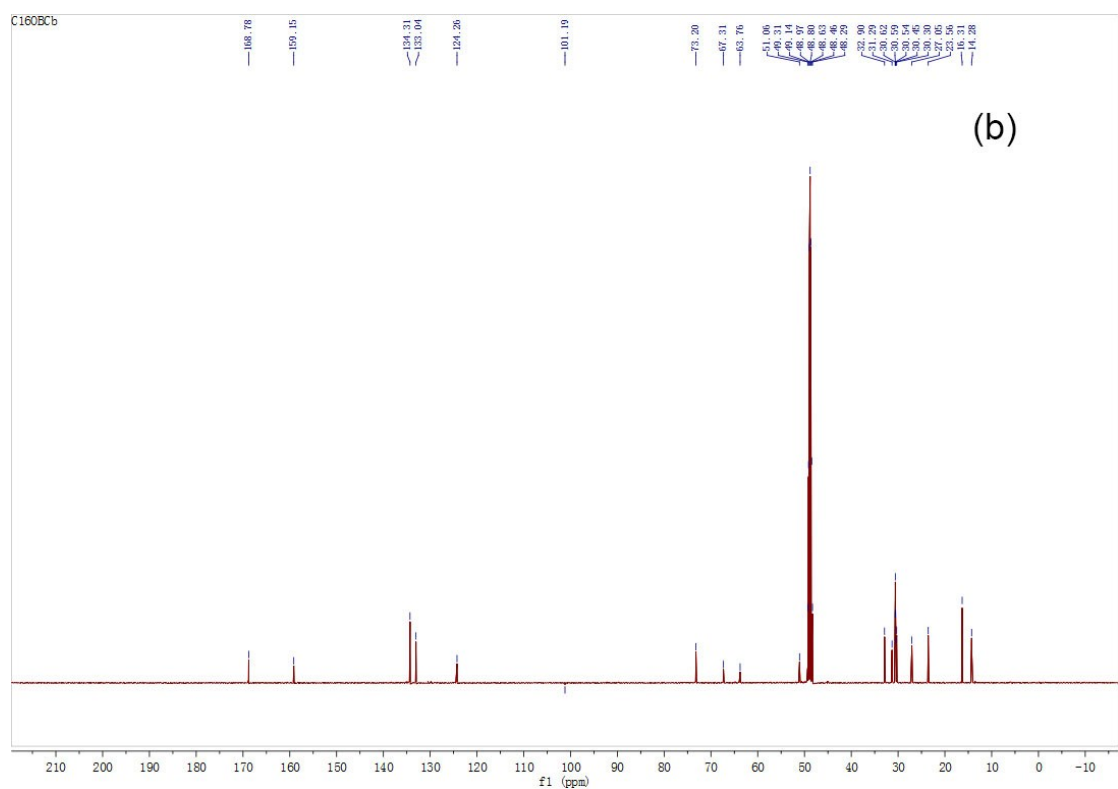
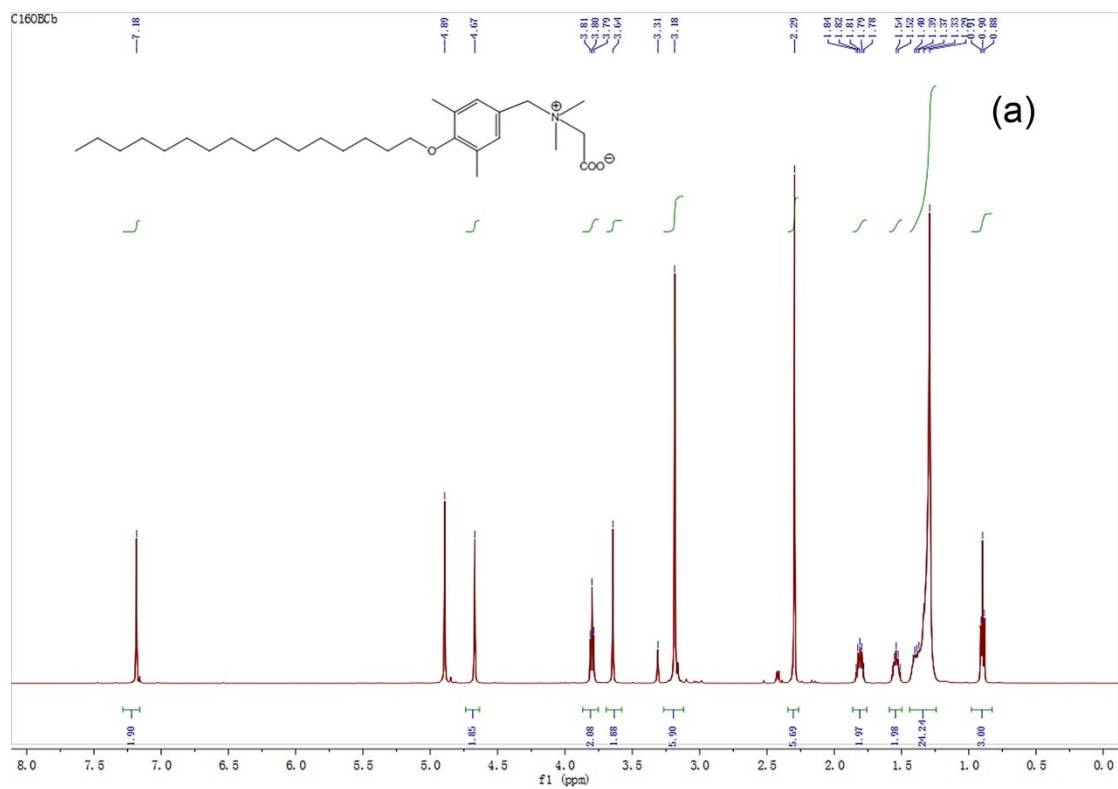


Fig. S11. ^1H NMR (a) and ^{13}C NMR (b) spectra of 2-((4-(hexadecyloxy)-3,5-dimethylbenzyl)-dimethylammonio)acetate (C_{16}OBCb) in CD_3OD .

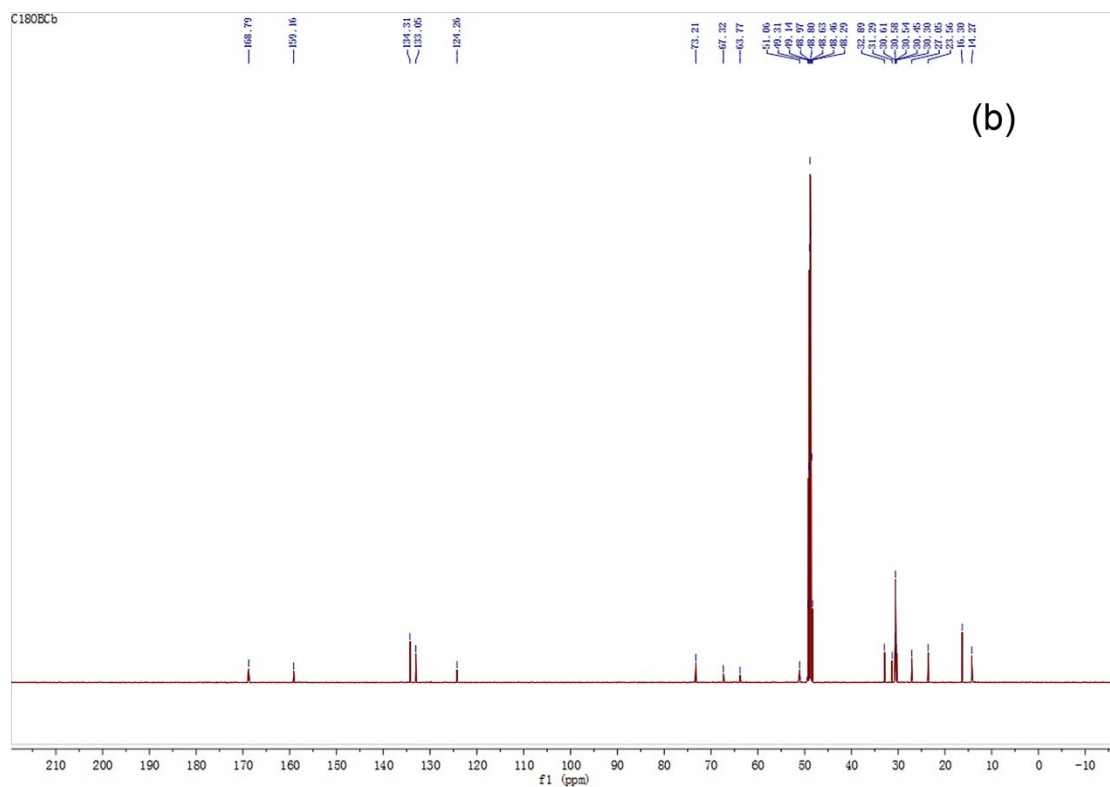
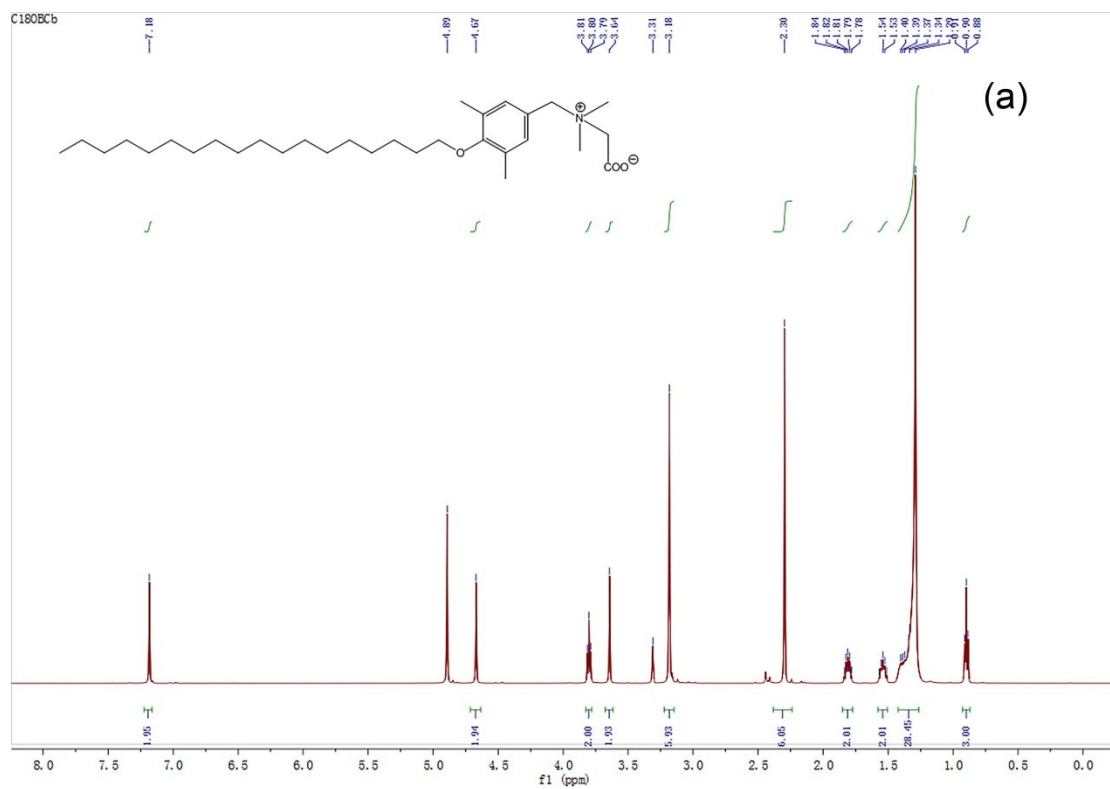


Fig. S12. ^1H NMR (c) and ^{13}C NMR (d) spectra of 2-((4-(octadecyloxy)-3,5-dimethylbenzyl)-dimethylammonio)acetate (C_{18}OBCb) in CD_3O .

2. Fluorescence spectra of C_n OBCb ($n = 12, 14, 16, 18$)

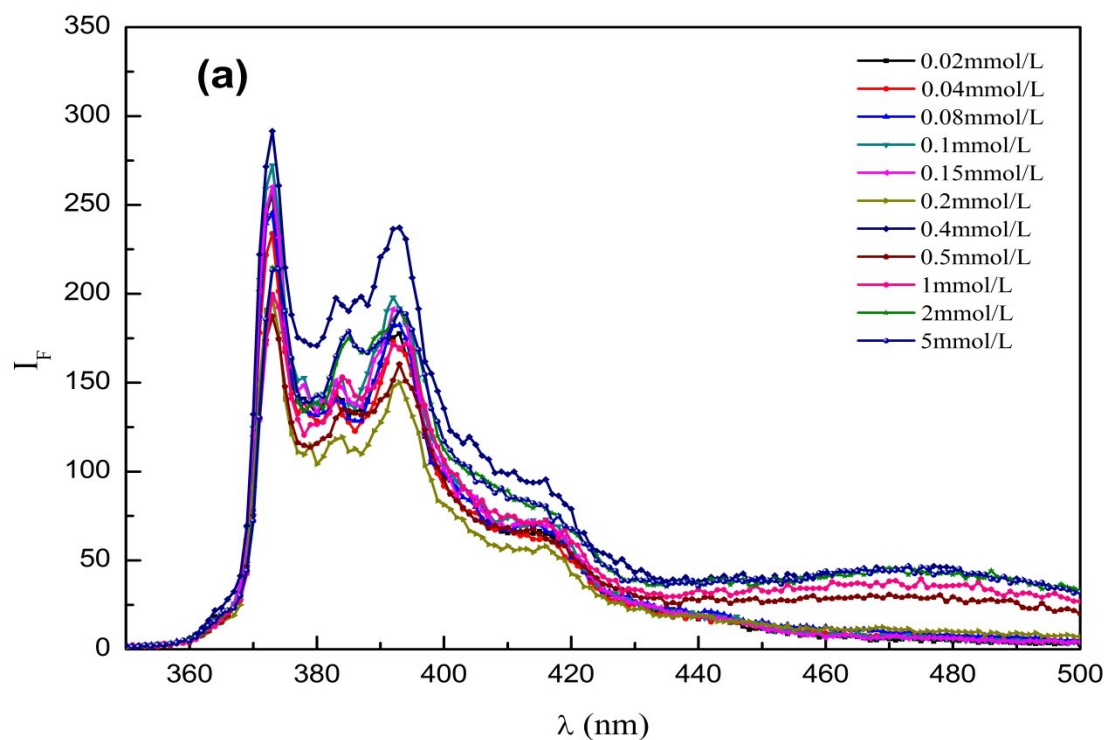


Fig. S13. Fluorescence spectrum of C_{12} OBCb

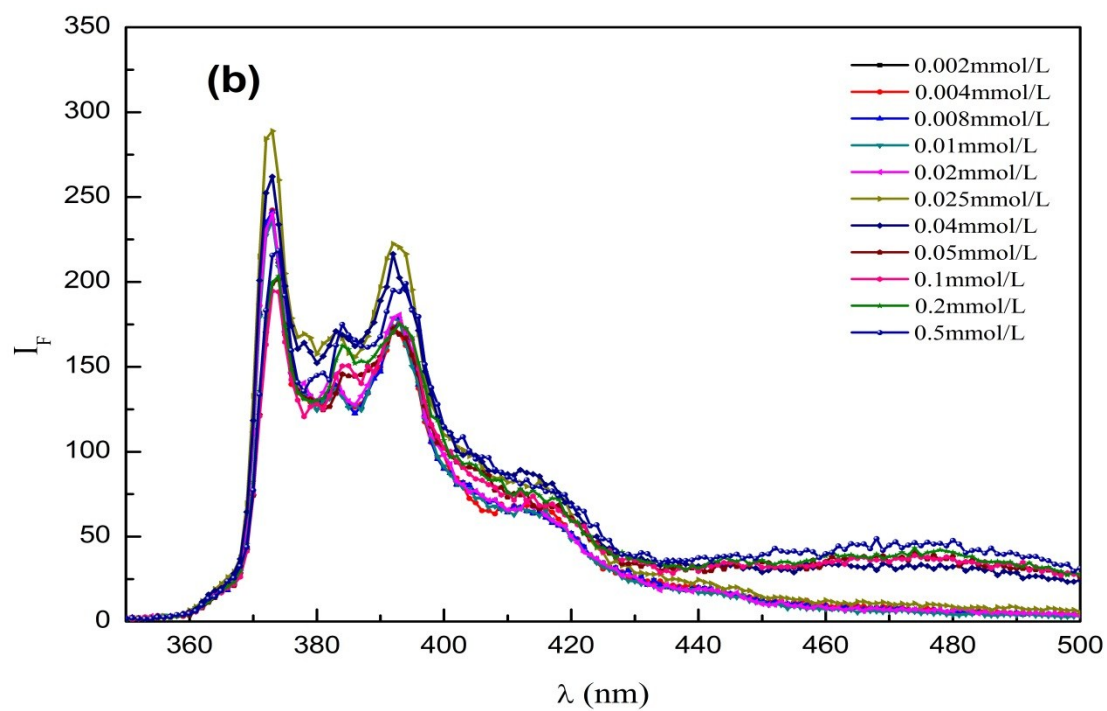


Fig. S14. Fluorescence spectrum of C_{14} OBCb

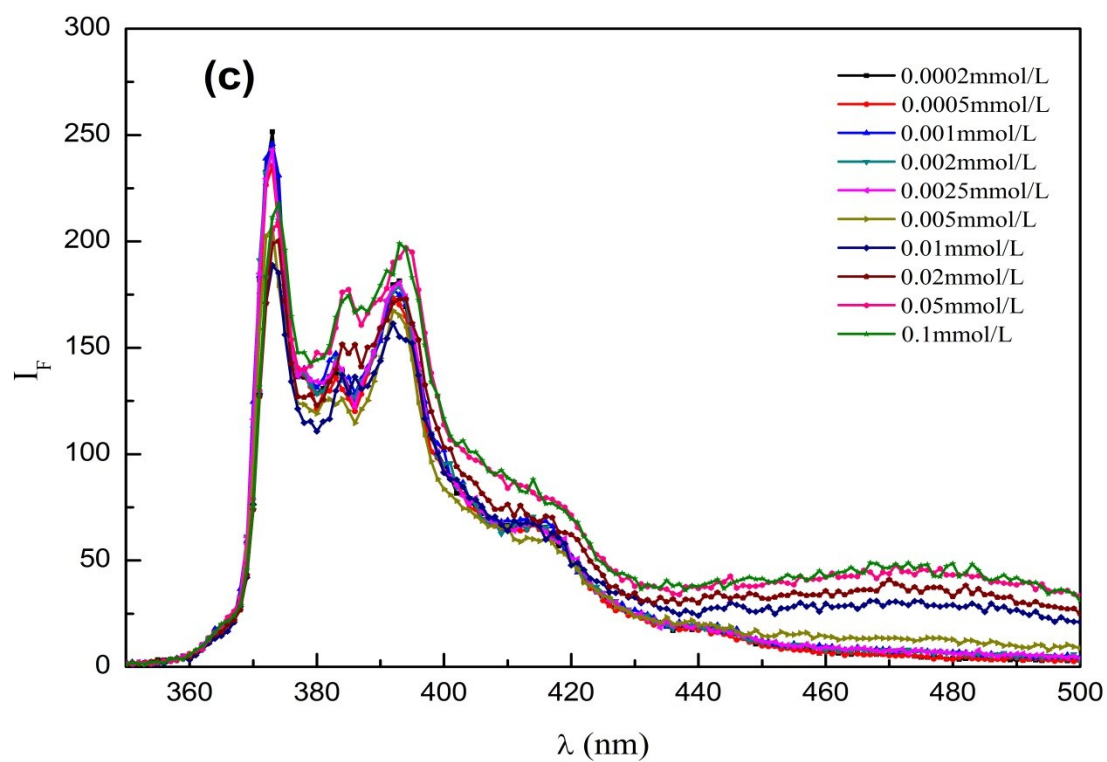


Fig. S15. Fluorescence spectrum of C₁₆OBCb

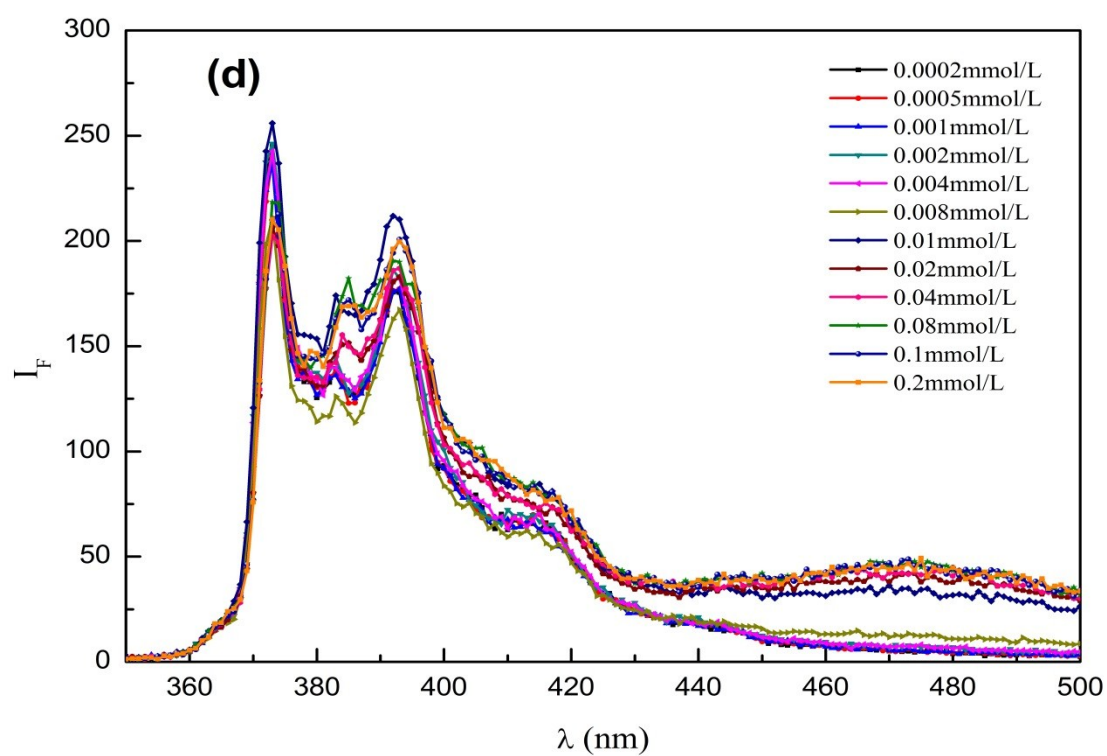


Fig. S16. Fluorescence spectrum of C₁₈OBCb

3. Fluorescent image for C₁₂OBCb solution

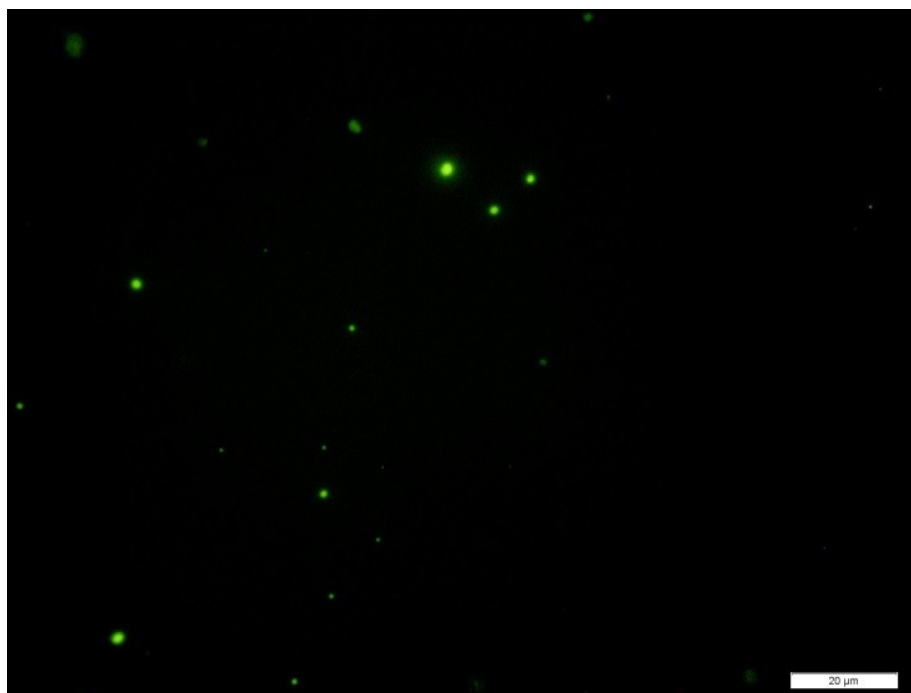


Fig. S17. Fluorescent image for C₁₂OBCb solution (3.76 mmol dm⁻³) dyed with calcein.

4. DLS data of C_nOBCb (*n* = 12, 14, 16, 18)

Table S1 DLS data of C_nOBCb

Surfactant	Concentration	PDI	Peak1 /nm	I ₁ /%	Peak2 /nm	I ₂ /%
C ₁₂ OBCb	5×cmc	0.305	14.1	14.1	76.7	85.9
	10×cmc	0.369	24.7	20	93.5	80
	20×cmc	0.416	31.5	35.1	110.3	64.9
C ₁₄ OBCb	5×cmc	0.263	16.9	9.7	82.1	90.3
	10×cmc	0.353	23.1	17.6	86.7	82.4
	20×cmc	0.394	32.6	41.6	110.6	58.4
C ₁₆ OBCb	5×cmc	0.294	17.4	12.1	76.5	87.9
	10×cmc	0.330	26.4	15.2	98.8	84.8
	20×cmc	0.369	35.8	45.6	114.7	54.4
C ₁₈ OBCb	5×cmc	0.246	17.2	12.9	84.6	87.1
	10×cmc	0.342	23.5	15.6	89.1	84.4
	20×cmc	0.407	41.1	49.2	151.9	50.8

5. The composition of the used formation brine

Table S2 The composition of the used formation brine.

Na ⁺ +K ⁺ (mg/L)	Mg ²⁺ (mg/L)	Ca ²⁺ (mg/L)	Cl ⁻ (mg/L)	SO ₄ ²⁻ (mg/L)	HCO ₃ ⁻ (mg/L)	CO ₃ ²⁻ (mg/L)
2992.22	21.07	86.83	2735.23	3.49	3596.11	7636.89