Supporting Information

Synthesis and pH-stimuli responsive research of gemini amine-oxide surfactants containing amides

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11-3-11-OA: Mass Spectra: Cationic scanning *M/E*: 585.0 $[M+1]^+$, 607.0 $[M+Na^+]$; FTIR Spectra (KBr, v, cm^{-1}): 3337.76, 3277.43 (N-H), 3000~2843 (C-H), 1639.52 (C=O), 1558.54 (N-H), 1490~1350 (C-H), 1310~1200 (C-N), 1036.95 (N-O), 716.41 (-(CH2)n-); ^{1}H-NMR Spectra [$CDCl_3$, 600 MHz, δ ppm]: 0.868-0.891 [t, 6H, J=7.2 Hz, CH_3C-of two long alkyl chains], 1.254 [m, methylene in two long alkyl chains, $C(CH_2)_8C$-], 1.603 [tt, 4H, C-C_8-CH_2-C-], 2.196-2.223 [t, 4H, J=7.8 Hz, -CH_2(C=O)N-], 2.279 [tt, 2H, N^+-C-CH_2-C-N^+], 3.321 [s, 6H, CH_3-N^+], 3.599 [t, 4H, N^+-CH_2-C-N(C=O)-], 3.667 [t, 4H, -CH_2N(C=O)-], 3.923 [t, 6H, J=5.4 Hz, N^+-C-C-CH_2-N^+].

13-3-13-OA: Mass Spectra: Cationic scanning *M/E*: 641.0 $[M+1]^+$, 663.1 $[M+Na^+]$; FTIR Spectra (KBr, v, cm^{-1}): 3337.98, 3280.81 (N-H), 3000~2843 (C-H), 1640.10 (C=O), 1558.82 (N-H), 1490~1350 (C-H), 1310~1200 (C-N), 1037.44 (N-O), 722.03 (-(CH2)n-); ^{1}H-NMR Spectra [$CDCl_3$, 600 MHz, δ ppm]: 0.868-0.891 [t, 6H, J=7.2 Hz, CH_3C-of two long alkyl chains], 1.251 [m, methylene in two long alkyl chains, $C(CH_2)_{10}C$-], 1.602 [tt, 4H, C-C_{10}-CH_2-C-], 2.198-2.222 [t, 4H, J=7.8 Hz, -CH_2(C=O)N-], 2.274 [tt, 2H, N^+-C-CH_2-C-N^+], 3.269 [s, 6H, CH_3-N^+], 3.547-3.568 [t, 4H, J=6.6 Hz, N^+-CH_2-C-N(C=O)-], 3.632 [t, 4H, -CH_2N(C=O)-], 3.859-3.884 [t, 6H, J=5.4 Hz, N^+-C-C-CH_2-N^+].

15-3-15-OA: Mass Spectra: Cationic scanning *M/E*: 697.0 $[M+1]^+$, 720.1 $[M+Na^+]$; FTIR Spectra (KBr, v, cm^{-1}): FTIR Spectra (KBr, v, cm^{-1}): 3312.60 (N-H), 3000~2843 (C-H), 1652.95 (C=O), 1548.64 (N-H), 1490~1350 (C-H), 1310~1200 (C-N), 1099.59 (N-O), 719.87 (-(CH2)n-); ^{1}H-NMR Spectra [$CDCl_3$, 600 MHz, δ ppm]: 0.868-0.891 [t, 6H, J=7.2 Hz, CH_3C-of two long alkyl chains], 1.254 [m, methylene in two long alkyl chains, $C(CH_2)_{12}C$-], 1.601 [tt, 4H, C-C_{12}-CH_2-C-], 2.191-2.217 [t, 4H,

J=7.8 Hz, -CH_2(C=O)N-], 2.297 [tt, 2H, N^+-C-CH_2-C-N^+], 3.276 [s, 6H, CH_3-N^+], 3.583-3.605 [t, 4H, J=6.6 Hz, N^+-CH_2-C-N(C=O)-], 3.634 [t, 4H, -CH_2N(C=O)-], 3.844-3.862 [t, 6H, J=5.4 Hz, N^+-C-C-CH_2-N^+].

17-3-17-OA: Mass Spectra: Cationic scanning *M/E*: 753.1 $[M+1]^+$, 776.1 [$M+Na^+$]; Anion scanning *M/E*: 45.0; FTIR Spectra (KBr, v, cm^{-1}): 3288.23 (N-H), 3000~2843 (C-H), 1640.85 (C=O), 1558.36 (N-H), 1490~1350 (C-H), 1310~1200 (C-N), 1113.36 (N-O), 720.44 (-(CH2)n-); ^{1}H-NMR Spectra [$CDCl_3$, 600 MHz, δ ppm]: 0.868-0.891 [t, 6H, J=7.2 Hz, CH_3C-of two long alkyl chains], 1.254 [m, methylene in two long alkyl chains, C$(CH_2)_{14}$C-], 1.602 [tt, 4H, C-C_{14}-CH_2-C-], 2.180-2.206 [t, 4H, J=7.8 Hz, -CH_2(C=O)N-], 2.304 [tt, 2H, N^+-C-CH_2-C-N^+], 3.279 [s, 6H, CH_3-N^+], 3.570-3.586 [t, 4H, J=6.0 Hz, N^+-CH_2-C-N(C=O)-], 3.652 [t, 4H, -CH_2N(C=O)-], 3.845-3.862 [t, 6H, J=5.4 Hz, N^+-C-C-CH_2-N^+].

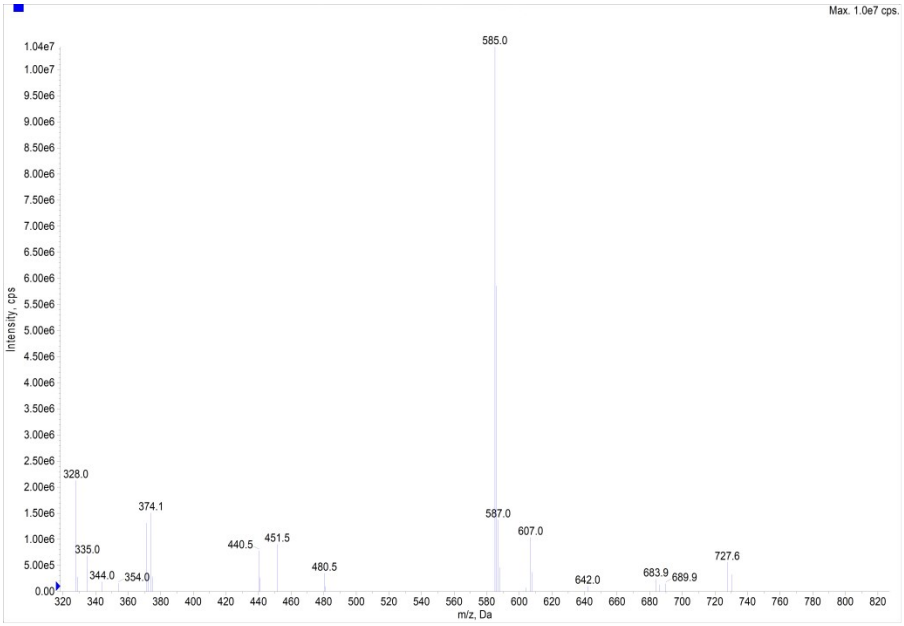

Fig. S1 Cationic scanning mass spectra of 11-3-11-OA

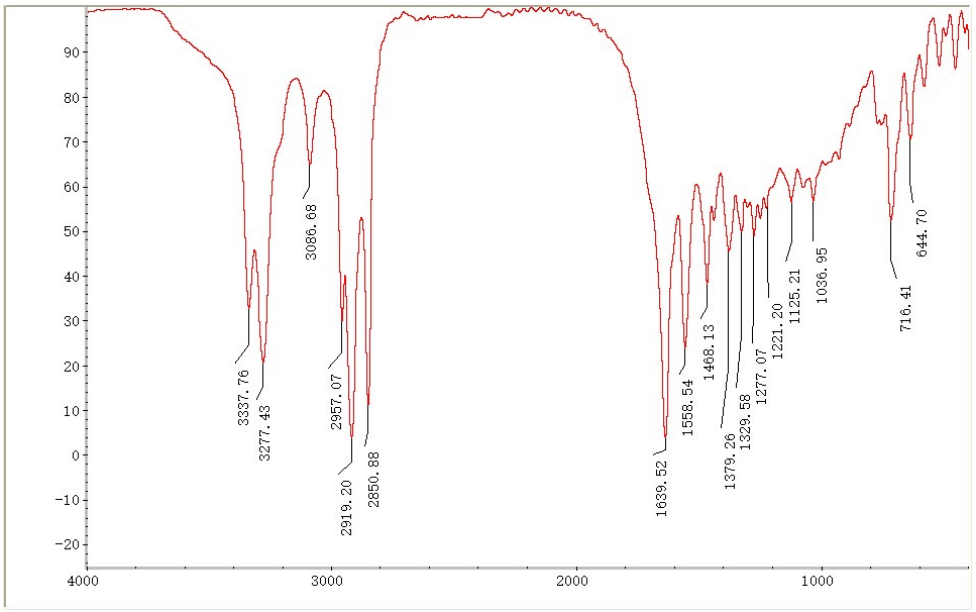

Fig. S2 FTIR spectra of 11-3-11-OA

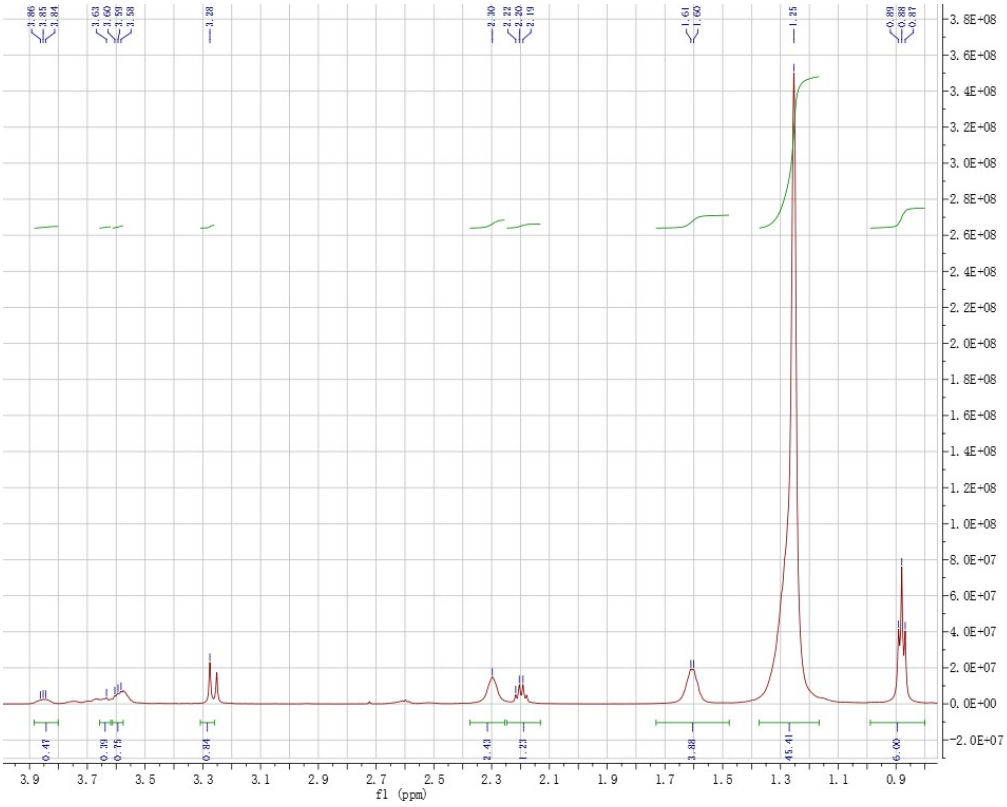

Fig. S3 ^{1}H-NMR spectra of 16-3-16-AO