

Electronic Supporting Information:

Wormlike Micelles Formed by Gemini Surfactants with Hydroxyethyl Methyl Quaternary Ammonium Headgroups

Qintang Li, Xudong Wang, Xiu Yue, Xiao Chen*

*Key Laboratory of Colloid and Interface Chemistry, Shandong University,
Ministry of Education, Jinan 250100, China*

Synthesis and purification of m-4-m MEA

Synthesis N, N-dodecyl hydroxyethylmethyl amine was prepared by refluxing N-dodecyl bromide and 2(methylamino)ethanol in ethanol for 15h. 12-4-12 MEA were synthesized by refluxing N, N-dodecyl hydroxyethylmethyl (2.2 equiv) and α,ω -dibromobutane (1 equiv) in dry acetone for 3 days. After evaporation, the residue was purified by washing with hexane/ethyl acetate mixture and recrystallized from acetone/methanol for at least 3 times. 14-4-14 MEA and 16-4-16 MEA were prepared in a similar way. The products' purity was ascertained by ^1H NMR (nuclear magnetic resonance) spectrum in CD_3Cl .

12-4-12 MEA

^1H NMR δ 0.88 ppm(t, 6H); 1.26-1.30 ppm(br, m, 28H); 1.35 ppm(s, 8H); 1.75 ppm(br, m, 4H); 2.09 ppm(m, 4H); 3.28 ppm(s, 6H); 3.44 ppm(m, 4H); 3.62 ppm(t, 4H); 3.83 ppm(t, 4H); 4.10 ppm(s, 6H).

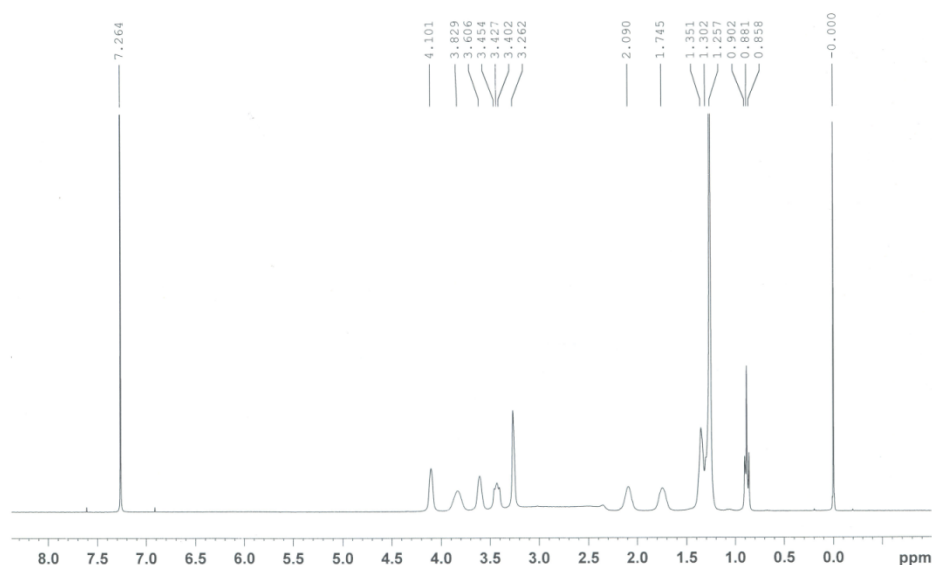


Fig. S1(a) The ^1H NMR spectrum of the Gemini surfactant 12-4-12 MEA.

14-4-14 MEA

^1H NMR δ 0.88 ppm(t, 6H); 1.26-1.30 ppm(br, m, 36H); 1.35 ppm(s, 8H); 1.75 ppm(br, m, 4H); 2.07 ppm(m, 4H); 3.28 ppm(s, 6H); 3.46 ppm(m, 4H); 3.63 ppm(t, 6H); 3.79 ppm(t, 4H); 4.10 ppm(s, 4H).

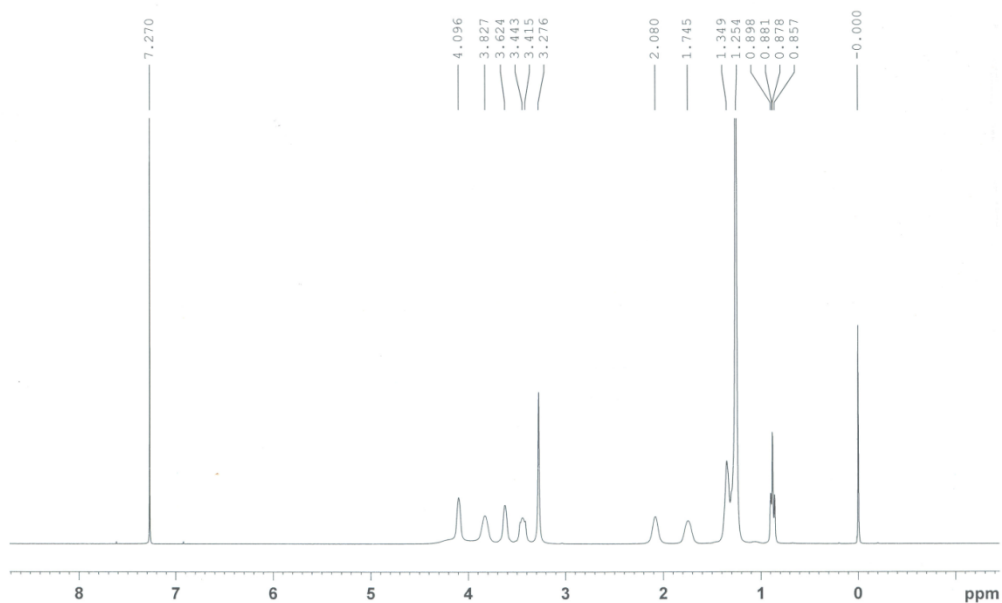


Fig. S1(b) The ^1H NMR spectrum of the Gemini surfactant 14-4-14 MEA.

16-4-16 MEA

^1H NMR δ 0.88 ppm(t, 6H); 1.26-1.30 ppm(br, m, 44H); 1.35 ppm(s, 8H); 1.75 ppm(br, m, 4H); 2.09 ppm(m, 4H); 3.28 ppm(s, 6H); 3.44 ppm(m, 4H); 3.62 ppm(t, 4H); 3.84 ppm(t, 4H); 4.10 ppm(s, 4H); 4.40 ppm(t, 6H).

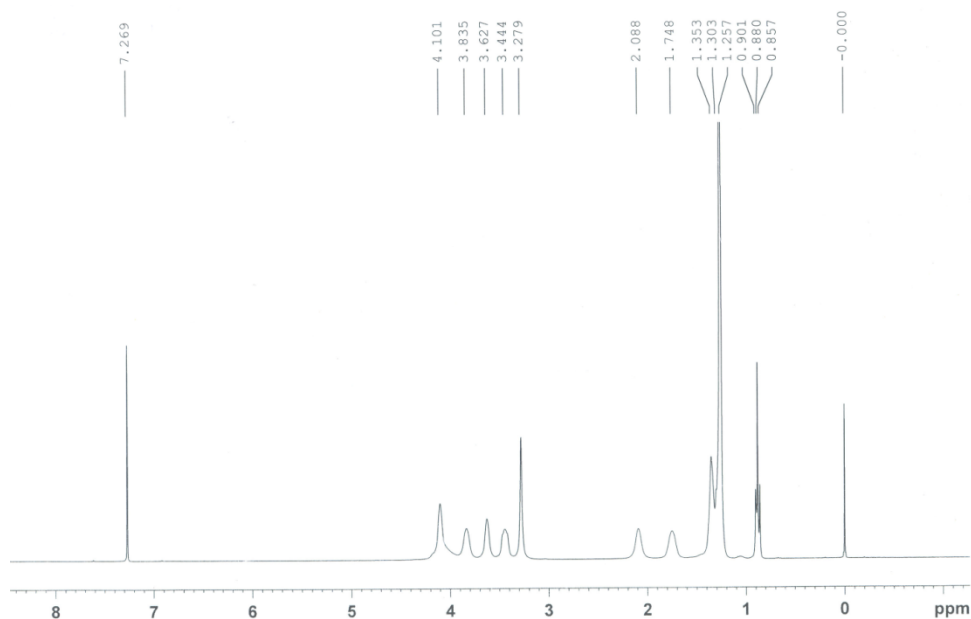


Fig. S1(c) The ^1H NMR spectrum of the Gemini surfactant 16-4-16 MEA.

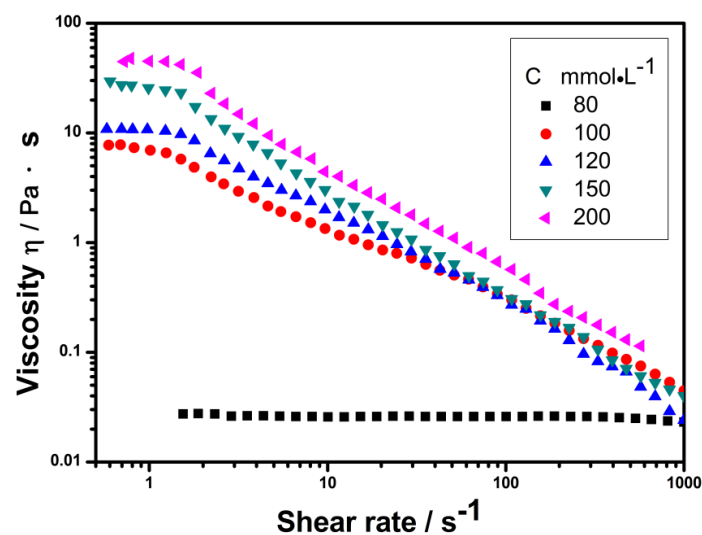


Fig. S2 Steady shear rate-viscosity (η) curves for 14-4-14 solutions at various concentrations.

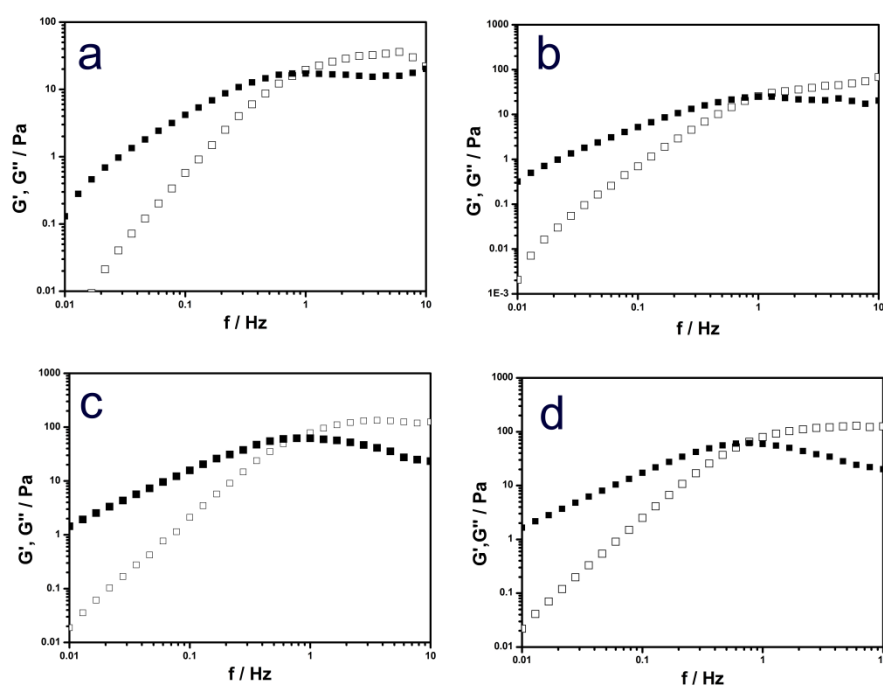


Fig. S3 Variation of G' (open) and G'' (solid) as a function of f in 14-4-14 aqueous solutions at different concentrations ($\text{mmol}\cdot\text{L}^{-1}$) . (a)100, (b)120, (c)150, (d)200.

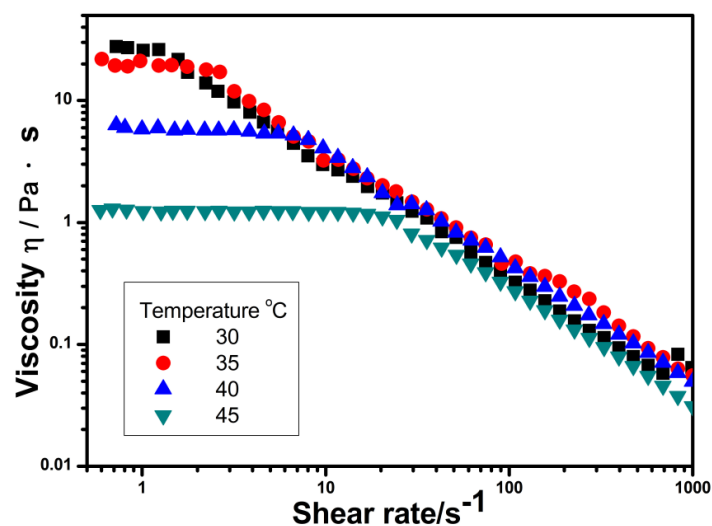


Fig. S4 Steady shear rate-viscosity (η) curves for 150 mmol·L⁻¹ 14-4-14 MEA solutions at various temperatures.

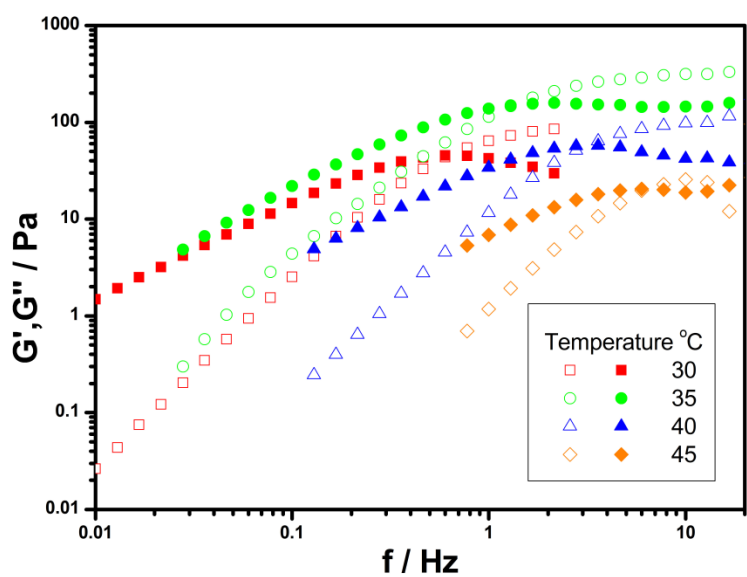


Fig. S5 Variation of G' (open) and G'' (solid) as a function of f in 150 mmol·L⁻¹ 14-4-14 MEA aqueous solution at different temperatures.