Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Facile control of surfactant lamellar phase transition and adsorption behavior.

Rui A. Gonçalves,[a] Polina Naidjonoka,[b] Tommy Nylander,[b] Maria G. Miguel,[c] Björn Lindman,[a,b] and Yeng Ming Lam [*a]

[a] School of Materials Science and Engineering, Nanyang Technological University, 639798 Singapore, Singapore

[b] Division of Physical Chemistry, Department of Chemistry, Centre for Chemistry and Chemical Engineering, Lund University, SE-221 00 Lund, Sweden

[c] Department of Chemistry, University of Coimbra, 3004-535 Coimbra, Portugal

*Corresponding Author, e-mail addresses: YMLam@ntu.edu.sg

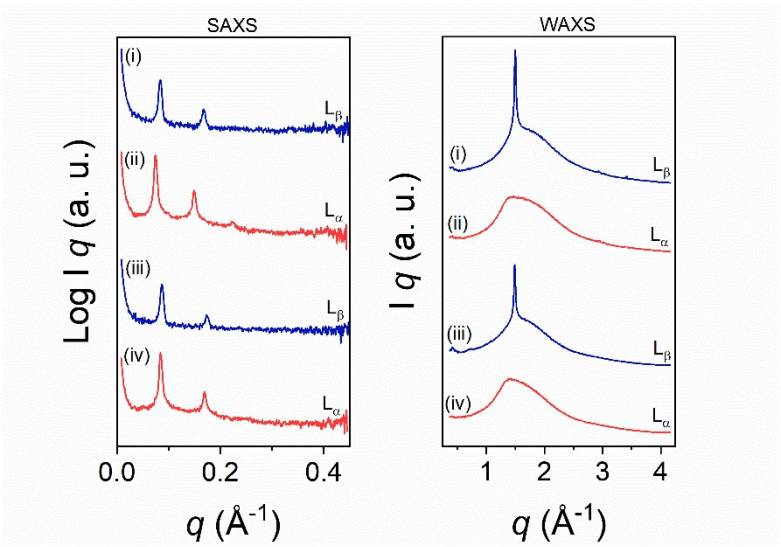

Fig. SI-1 Stacked SAXS/WAXS profiles for the original mixtures of 35 wt. % DODAC-water-acetic acid (AA). (i) SAXS/WAXS of 5 wt. % AA in the L_β (gel) phase; (ii) SAXS/WAXS of 5 wt. % AA in the L_α (liquid-crystalline) phase; (iii) SAXS/WAXS of 12.5 wt. % AA in the L_β phase; (iv) SAXS/WAXS of 12.5 wt. % AA in the L_α phase. The Bragg reflections on SAXS reveal the lamellar peak ratio of 1: 2: 3… On the WAXS regime the L_β phase peak at q = 1.50 Å^{-1}, and the L_α phase peak broadening at ca. 1.42 Å^{-1} are determined.

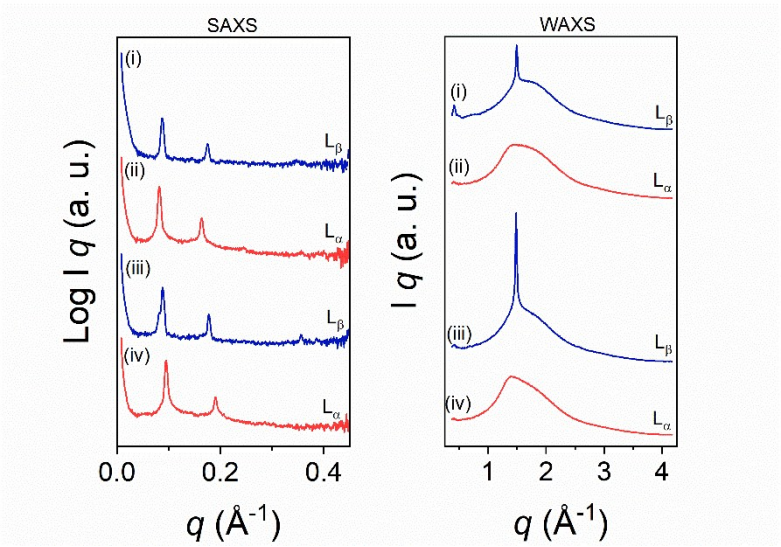

Fig. SI-2 Stacked SAXS/WAXS profiles for the original mixtures of 35 wt. % DODAC-water-propionic acid (PA). (i) SAXS/WAXS of 5 wt. % PA in the L_β (gel) phase; (ii) SAXS/WAXS of 5 wt. % PA in the L_α (liquid-crystalline) phase; (iii) SAXS/WAXS of 12.5 wt. % PA in the L_β phase; (iv) SAXS/WAXS of 12.5 wt. % PA in the L_α phase. The Bragg reflections on SAXS reveal the lamellar peak ratio of 1: 2: 3… On the WAXS regime the L_β phase peak at q = 1.49 Å^{-1}, and the L_α phase peak broadening at ca. 1.38 Å^{-1} are determined.

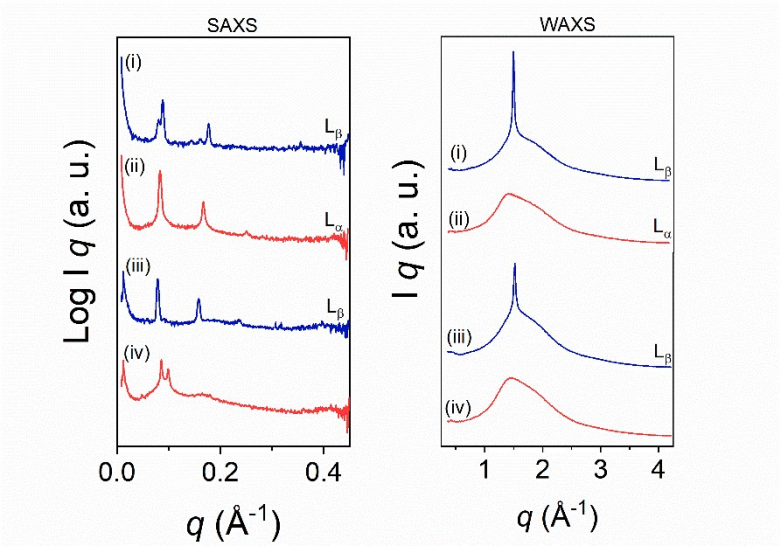

Fig. SI-3 Stacked SAXS/WAXS profiles for the original mixtures of 35 wt. % DODAC-water-benzyl alcohol (BenOH). (i) SAXS/WAXS of 5 wt. % BenOH in the L_β (gel) phase; (ii) SAXS/WAXS of 5 wt. % BenOH in the L_α (liquid-crystalline) phase; (iii) SAXS/WAXS of 12.5 wt. % BenOH in the L_β phase; (iv) SAXS/WAXS of 12.5 wt. % BenOH (unidentified phase). The Bragg reflections on SAXS reveal the lamellar peak ratio of 1: 2: 3… On the WAXS regime the L_β phase peak at q = 1.49 Å^{-1}, and the L_α phase peak broadening at ca. 1.40 Å^{-1} are determined.

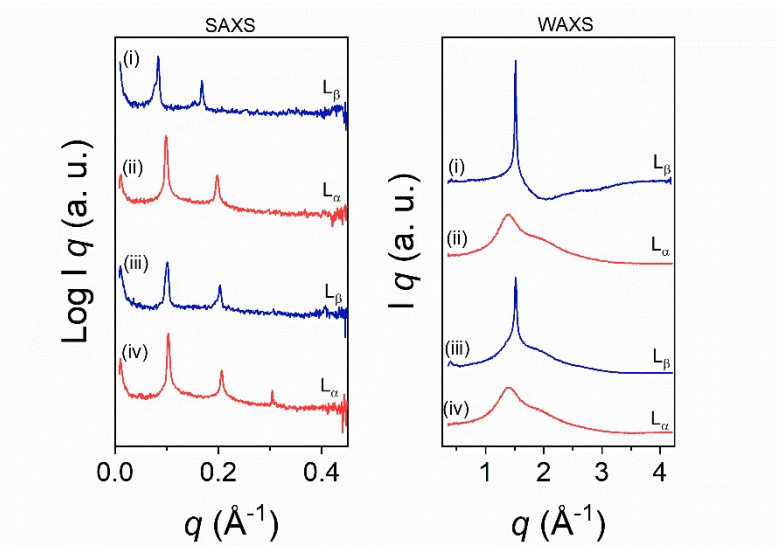

Fig. SI-4 Stacked SAXS/WAXS profiles for the original mixtures of 35 wt. % DODAC-water-phenoxyethanol (PhEtOH). (i) SAXS/WAXS of 5 wt. % PhEtOH in the L_β (gel) phase; (ii) SAXS/WAXS of 5 wt. % PhEtOH in the L_α (liquid-crystalline) phase; (iii) SAXS/WAXS of 12.5 wt. % PhEtOH in the L_β phase; (iv) SAXS/WAXS of 12.5 wt. % PhEtOH in the L_α (liquid-crystalline) phase. The Bragg reflections on SAXS reveal the lamellar peak ratio of 1: 2: 3… On the WAXS regime the L_β phase peak at q = 1.52 Å^{-1}, and the L_α phase peak broadening at ca. 1.38 Å^{-1} are determined.

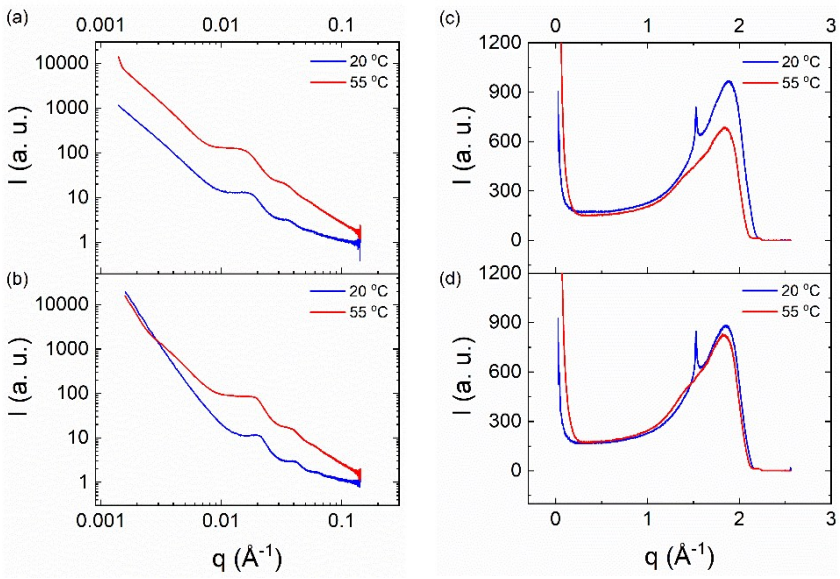

Fig. SI-5 Scattering profiles of diluted mixtures at 20 °C (below T_m) and 55 °C (above T_m). (a) SAXS of 5 wt. % acetic acid in DODAC-water, (b) SAXS of 12.5 wt. % acetic acid in DODAC-water, (c) WAXS of 5 wt. % acetic acid in DODAC-water, and (d) WAXS of 12.5 wt. % acetic acid in DODAC-water.

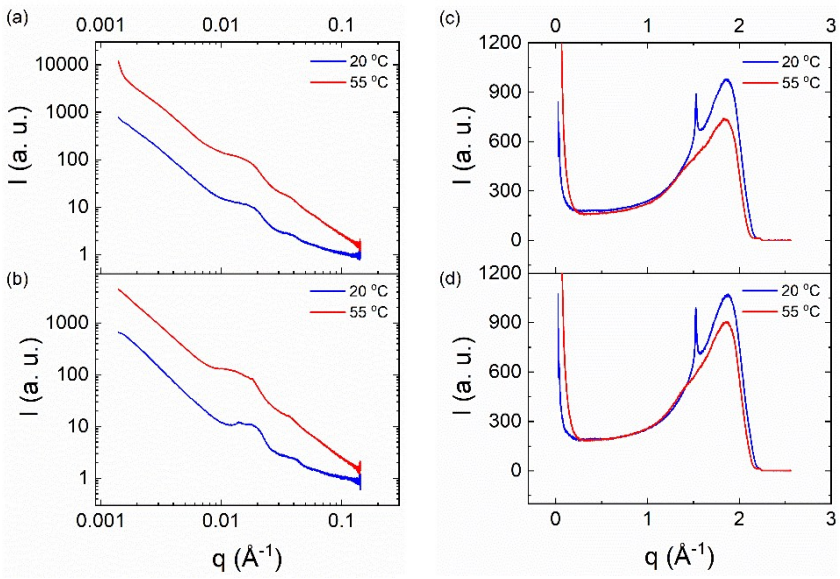

Fig. SI-6 Scattering profiles of diluted mixtures at 20 °C (below T_m) and 55 °C (above T_m). (a) SAXS of 5 wt. % propionic acid in DODAC-water, (b) SAXS of 12.5 wt. % propionic acid in DODAC-water, (c) WAXS of 5 wt. % propionic acid in DODAC-water, and (d) WAXS of 12.5 wt. % propionic acid in DODAC-water.

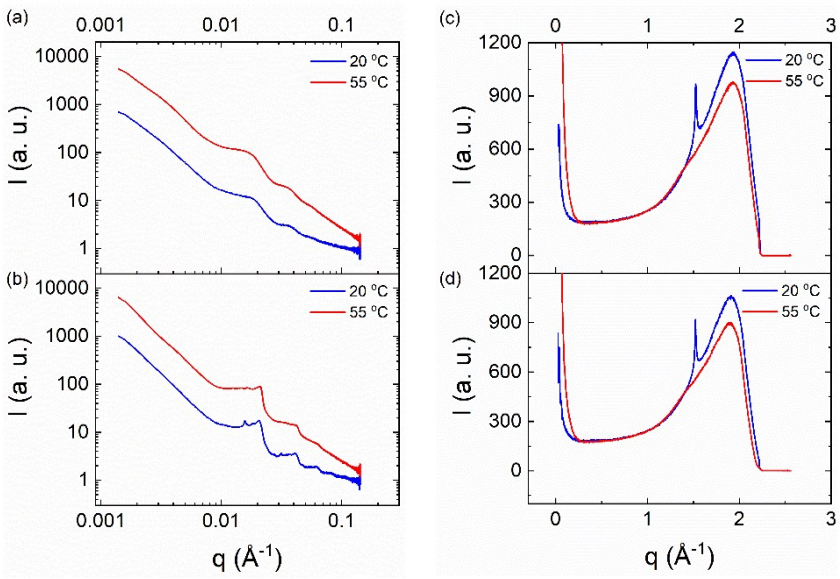

Fig. SI-7 Scattering profiles of diluted mixtures at 20 °C (below T_m) and 55 °C (above T_m). (a) SAXS of 5 wt. % butyric acid in DODAC-water, (b) SAXS of 12.5 wt. % butyric acid in DODAC-water, (c) WAXS of 5 wt. % butyric acid in DODAC-water, and (d) WAXS of 12.5 wt. % butyric acid in DODAC-water.

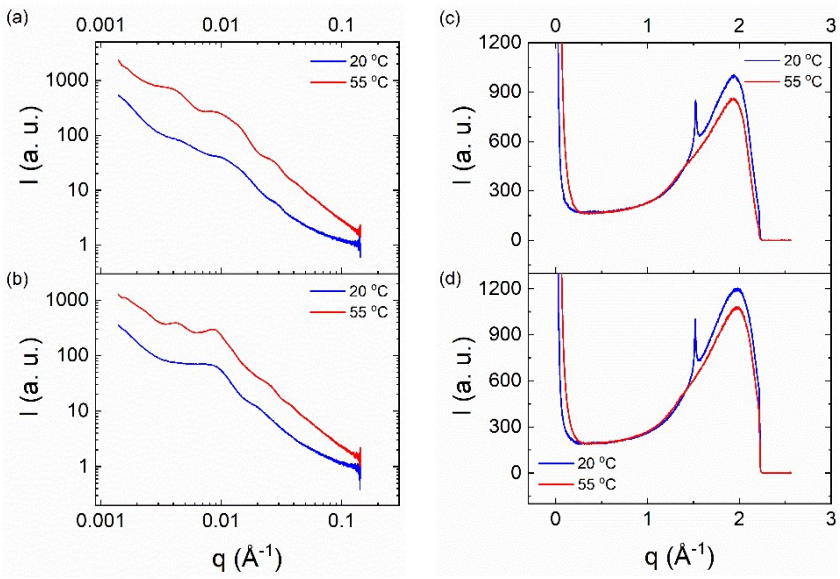

Fig. SI-8 Scattering profiles of diluted mixtures at 20 °C (below T_m) and 55 °C (above T_m). (a) SAXS of 5 wt. % benzyl alcohol in DODAC-water, (b) SAXS of 12.5 wt. % benzyl alcohol in DODAC-water, (c) WAXS of 5 wt. % benzyl alcohol in DODAC-water, and (d) WAXS of 12.5 wt. % benzyl alcohol in DODAC-water.

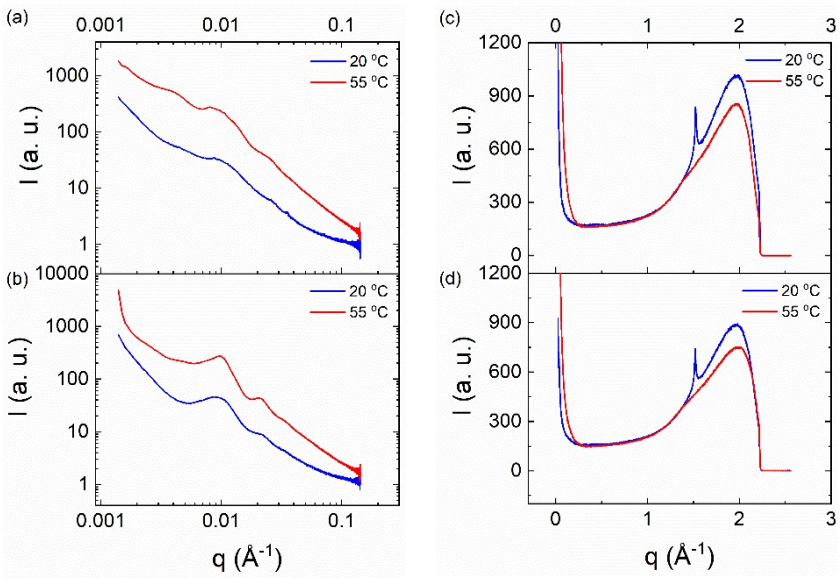

Fig. SI-9 Scattering profiles of diluted mixtures at 20 °C (below T_m) and 55 °C (above T_m). (a) SAXS of 5 wt. % phenoxyethanol in DODAC-water, (b) SAXS of 12.5 wt. % phenoxyethanol in DODAC-water, (c) WAXS of 5 wt. % phenoxyethanol in DODAC-water, and (d) WAXS of 12.5 wt. % phenoxyethanol in DODAC-water.

Table SI-1 Values of the adsorbed amount, *Γ*, average layer thickness, *d*, and area per surfactant molecule, *a*, of the diluted DODAC-water-12.5 wt. % butyric acid samples with increasing concentration of the solution in the ellipsometry cuvette. Concentration increases from C1 to C4.

Diluted sample	Adsorbed amount, Γ (μmol/m²)	Average thickness, *d* (Å)	Area per molecule, *a* (Å²)
C1 – 3.6 mM	4.37 ± 0.02	80 ± 3	38
C2 – 6.0 mM	4.55 ± 0.02	72 ± 3	36
C3 – 7.2 mM	4.65 ± 0.01	63 ± 2	36
C4 – 12.0 mM	5.06 ± 0.02	56 ±2	33