

Supporting Information

Permeation dynamics of microemulsions according to the amount of deep eutectic solvent when applied to the stratum corneum

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1. Results and Discussion

1-1. SAXS profiles of the MEs

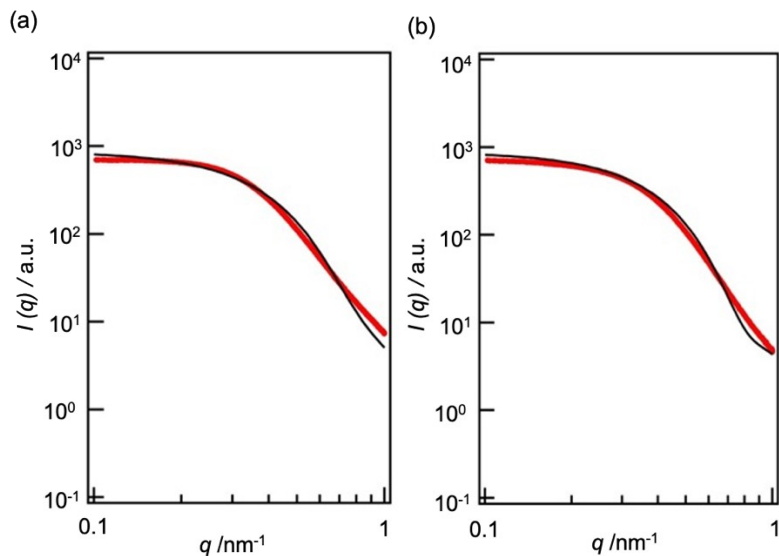


Fig.S1 SAXS profiles of a) 1/6 ME and b) 1/9 ME. Red: experimental data. Black: theoretical curve.

The experimental and theoretical curves exhibited good agreement in the low q region; however, discrepancies were observed in the high q region. The increased slope was attributed to the surfactant hydrocarbon chains behaving as Gaussian chains^{1,2}. In this study, only the size and shape of the MEs were evaluated.

1-2. SANS profiles of the d-MEs

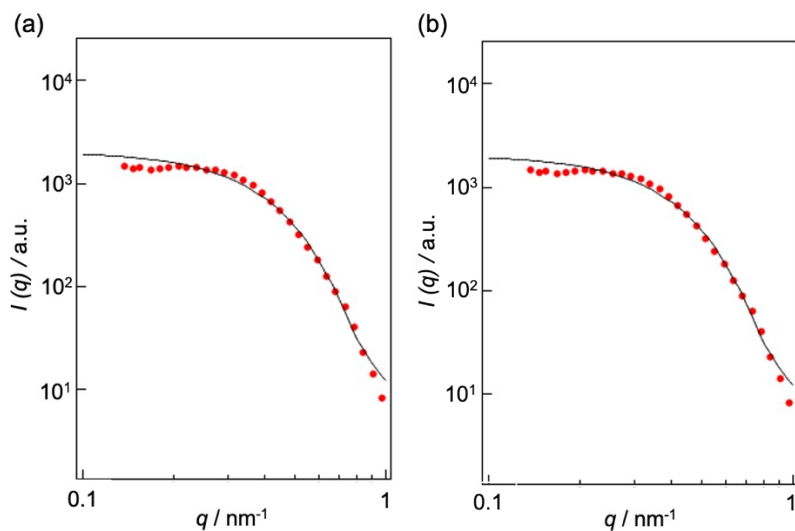


Fig. S2 SANS profiles of (a) 1/6 d-ME and (b) 1/9 d-ME (red: experimental data, black: theoretical curve).

The internal water phase of the MEs was replaced with D₂O to obtain d-MEs. The internal phases of 1/6 d-ME and 1/9 d-ME had radii of 4.3 and 4.0 nm, respectively.

1-3. Dynamic light scattering measurements of MEs

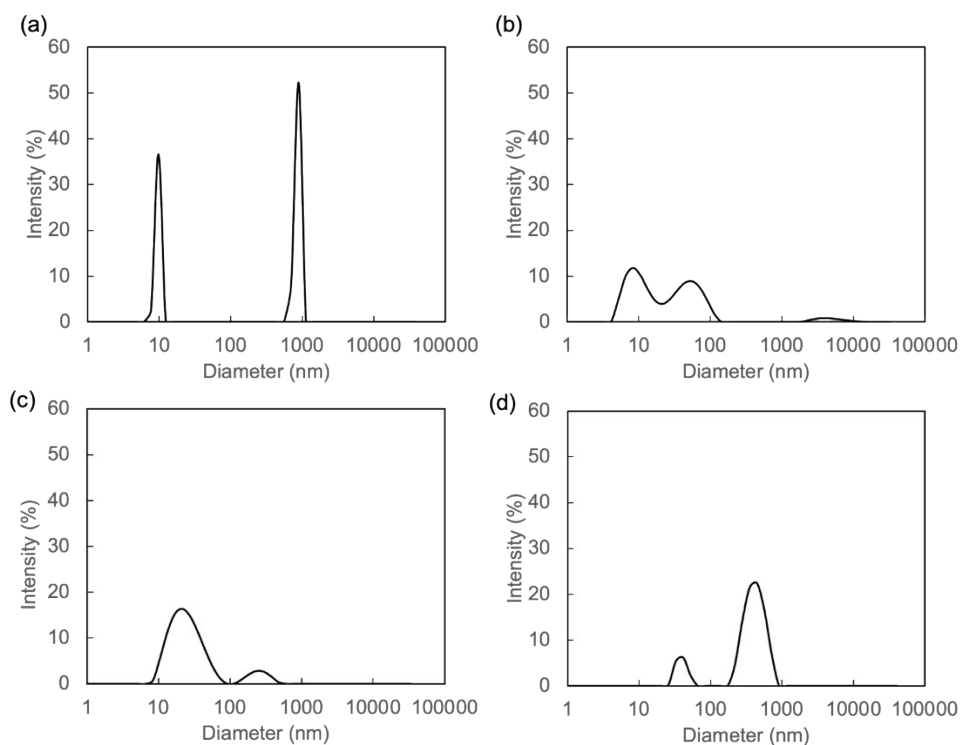


Fig. S3 Size distribution results for (a) 1/4 ME, (b) 1/6 ME, (c) 1/9 ME, and (d) 0/1 MEs obtained by DLS measurements at room temperature.

Table S1 Particle size distributions of MEs.

Sample name	Less than 100 nm (%)	More than 100 nm (%)
1/4 ME	39.2	60.8
1/6 ME	94.4	5.6
1/9 ME	89.5	10.5
0/1 ME	14.1	85.9

1/6 ME and 1/9 ME had fewer aggregates whereas 1/4 ME and 0/1ME exhibited some aggregation.

1.4. WAXS peaks of hydrocarbon chain packing in SCs when MEs were applied

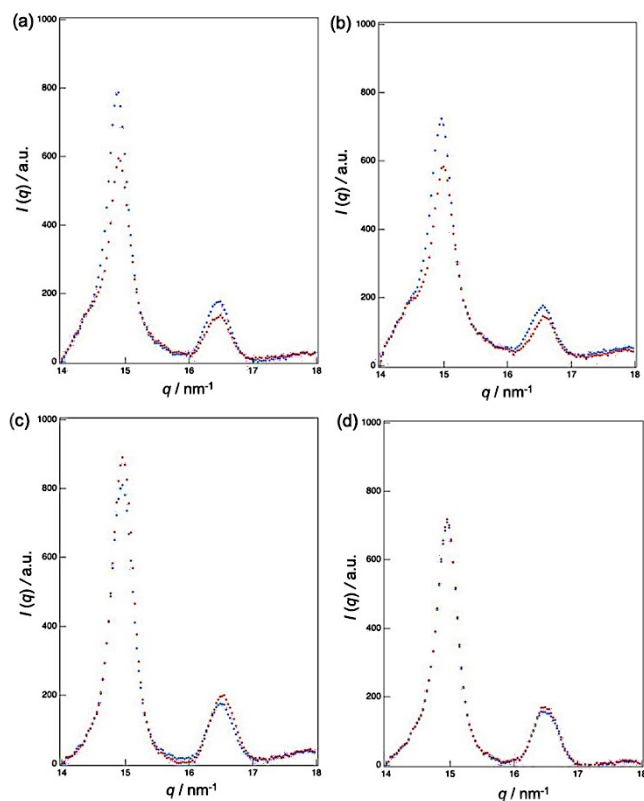


Fig.S4 WAXS profiles of SCs at 1 min (blue) and 180 min (red) after (a) 1/6 ME was applied to dry SC, (b) 1/9 ME was applied to dry SC, (c) 1/6 ME was applied to hydrated SC, and (d) 1/9 ME was applied to hydrated SC.

1-5. WAXS peaks area depending on the SC water contents

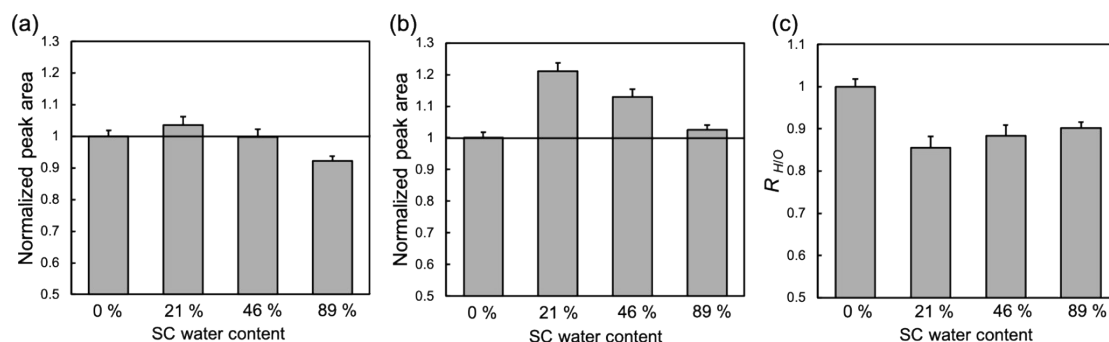


Fig. S5 Peak area ratios of (a) the 0.41 nm and (b) 0.37 nm peaks and (C) normalized $R_{H/O}$ values at each water content of the SC relative to those at 0% water content.

2. References

- 1 M. Sakuragi, S. Tsutsumi and K. Kusakabe, *Langmuir*, 2018, 34, 12635–12641.
- 2 J. S. Pedersen and M. C. Gerstenberg, *Macromolecules*, 1996, 29, 1363–1365.