Supporting Information

Soft Matter manuscript 'pH- and Temperature-Responsive Aqueous Foams Stabilized by Hairy Latex Particles'

by S. Fujii *et al.*

Corresponding author: Dr. Syuji Fujii; syuji.fujii@oit.ac.jp

Calculation of a polymerization degree of PDMA macroinitiator

Degree of polymerization was calculated from ^{1}H NMR result by rationing the proton peak intensity due to PDMA at 4.04 ppm to that originated from 2,2'-azobis[2-methyl-N-(2-(2-bromoisobutyryloxy)ethyl) propionamide], which was used as an initiator for atom transfer radical polymerization to synthesize the PDMA macroinitiator, at 1.31 ppm. It is clear that there is a good agreement between the targeted (theoretical) degree of polymerization calculated from the monomer/initiator molar ratio and that determined experimentally from ^{1}H NMR study.

Calculation of number of amine groups on the PS particle

The number of amine groups on one PDMA-PS particle was calculated to be 3.21×10^6 considering the PDMA/PS weight ratio of 2.86/97.14, which was determined by elemental microanalysis. For calculation of incorporation amount of amine groups, the diameter of 380 nm and density of PS of 1.05 g/cm^3 [1] were used.

Calculation for the diameter of gyration of the PDMA chain

The diameter of gyration of the PDMA chain (D) was calculated using the equation shown below [2],

$$D = 2\sqrt{\frac{na^2}{6}}$$

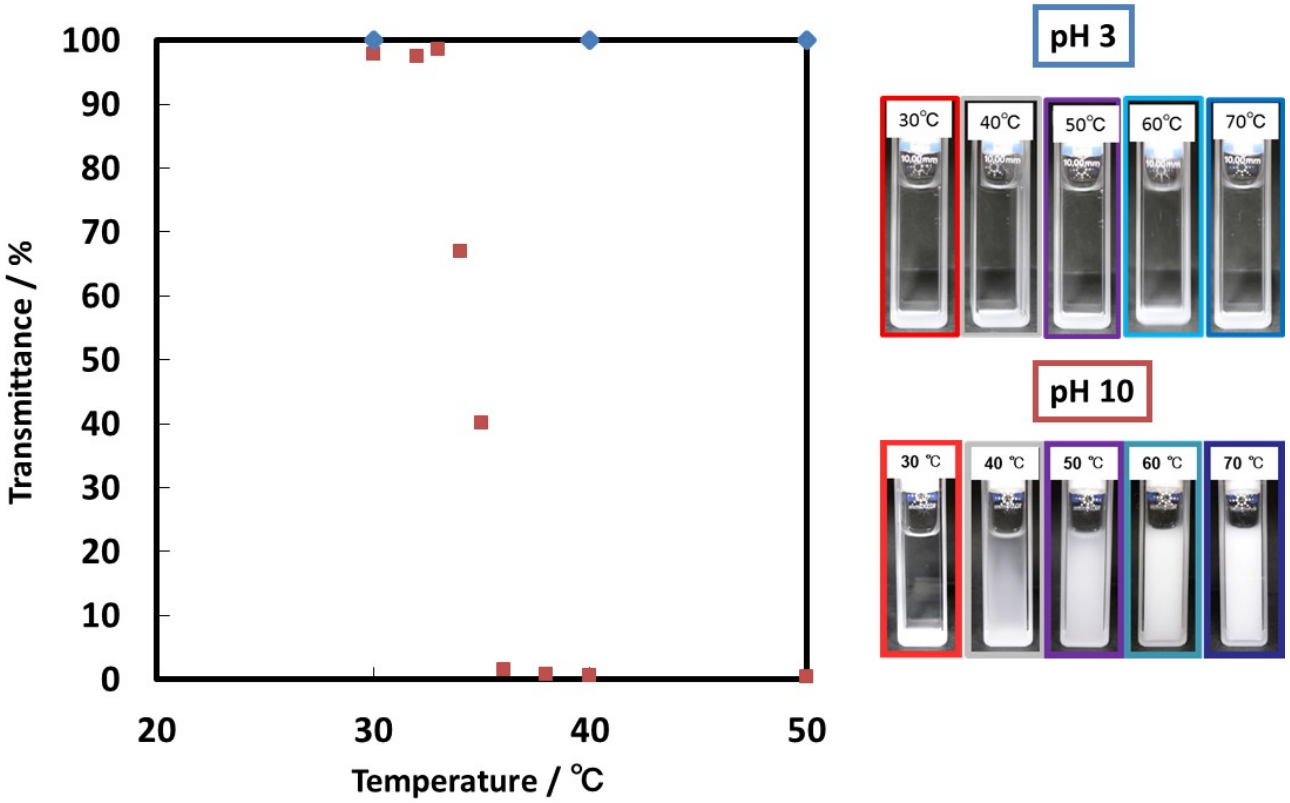
where n and a are bond number (2×60) and bond length (0.154 nm), respectively.

[1] J. Brandrup, E. H. Immergut, E. A. Grulke, *Polymer Handbook*, 4th ed.; Wiley: New York, 1999.

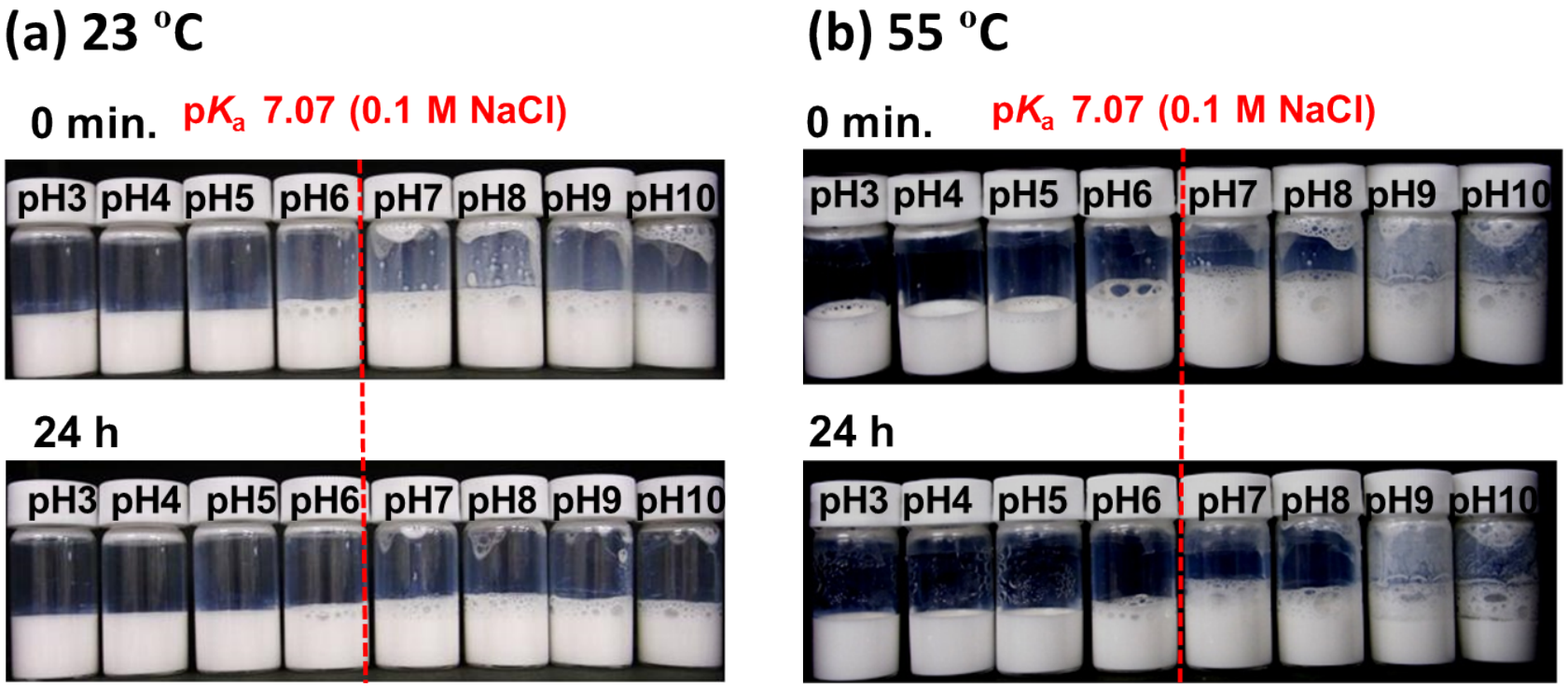
[2] S. Fujii, K. Aono, M. Suzaki, S. Hamasaki, S. Yusa and Y. Nakamura, *Macromolecules,* 2012, **45**, 2863.

Supporting Table S1. pH- and temperature-dependent behavior of foams prepared using the $PDMA_{60}$-PS latex particles (5.0 wt%, 0.1 M NaCl). Height of the foam layer versus pH of the aqueous dispersion recorded at different times: immediately after preparation, after 1 hour and after 24 hours.

pH	Temperature					
	23 ˚C			55 ˚C		
	0 h	1 h	24 h	0 h	1 h	24 h
3	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00
6	6.34	0.00	0.00	5.21	5.20	4.81
7	7.28	7.36	0.00	9.88	9.91	8.74
8	7.62	7.65	0.00	8.67	8.63	8.13
9	7.22	6.64	0.00	8.81	8.69	8.71
10	7.12	6.55	0.00	9.94	8.83	8.99



Supporting Figure S1. Percent transmittance (%T) at 545 nm for PDMA at (◆) pH 3 and (■) pH 10 at 1.0 wt% as a function of temperature. (0.1 M NaCl)



Supporting Figure S2. pH- and temperature-dependent behavior of foams prepared using the PDMA-PS latex particles (5.0 wt%, 0.1 M NaCl). Digital photograph of vessels taken 24 h after shaking an aqueous dispersion of particles at different pH values at (a) 23 °C and (b) 55 °C.