Supplementary Information

Modulating shape transition in surfactant stabilized reverse microemulsions

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A. RMs of dodecane/D_2O/AOT

Temperature induced structural changes

(i) $I(q)$ vs q from SANS measurements on RMs prepared at $\omega = 10$ and $\Phi = 0.10$

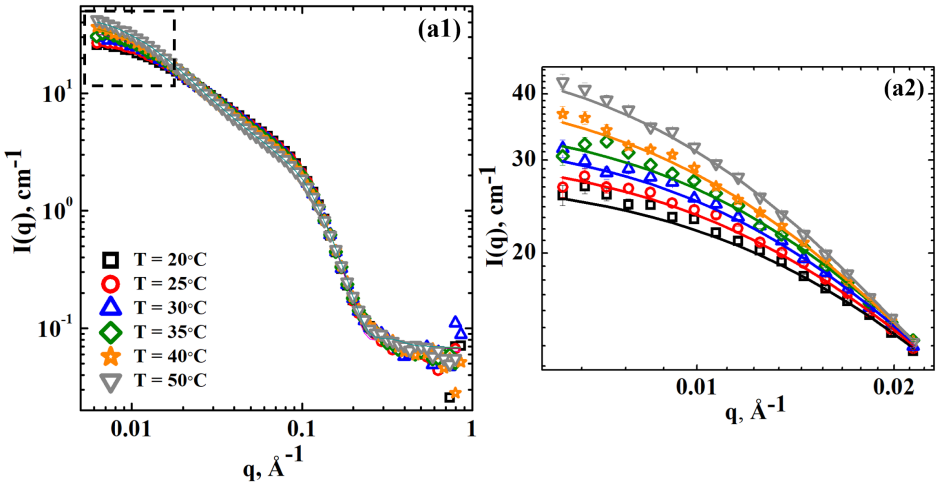

Fig.S 1 (a1): Temperature effect on the nanostructure of D_2O-in-dodecane RMs prepared at $\omega = 10$ and $\Phi = 0.10$ – $I(q)$ vs. q data recorded from SANS experiments. (a2): A magnified version of the $I(q)$ vs. q data in the low q regime. The symbols are the experimental data and the continuous lines visible in the enlarged panels are the model fits as described in the text.

Table.TS 1 The radius (R), polydispersity index of the radius ($R-PDI$), length (L), aspect ratio (AR) and stickiness parameter (τ) for the droplets in the D_2O-in-dodecane RMs prepared at $\omega = 10$ and $\Phi = 0.10$ over a range of temperatures (T) from 20 °C to 50 °C. The goodness of fit is given by the χ^2. These parameters are extracted from the model fits to the experimental SANS data in Figure S1. The polydispersity in the length of the droplets is constant with increase in temperature and $L-PDI \sim 1$

T (°C)	R (Å)	R-PDI	L (Å)	AR	τ	χ^2
20	15.41 ± 0.07	0.13	106.6 ± 4.9	3.45	0.177 ± 0.003	10.4
25	15.1 ± 0.08	0.13	119.9 ± 4.9	3.97	0.168 ± 0.002	8.4
30	14.9 ± 0.06	0.14	126.9 ± 5.4	4.25	0.156 ± 0.003	7.9
35	14.6 ± 0.07	0.15	142.1 ± 5.7	4.88	0.156 ± 0.003	6.6
40	14.3 ± 0.08	0.16	134.0 ± 7.8	4.68	0.136 ± 0.004	5.3
50	14.1 ± 0.09	0.15	138.6 ± 8.4	4.92	0.123 ± 0.003	3.1

(ii) $I(q)$ vs q from SANS measurements on RMs prepared at $\omega = 10$ and $\Phi = 0.15$

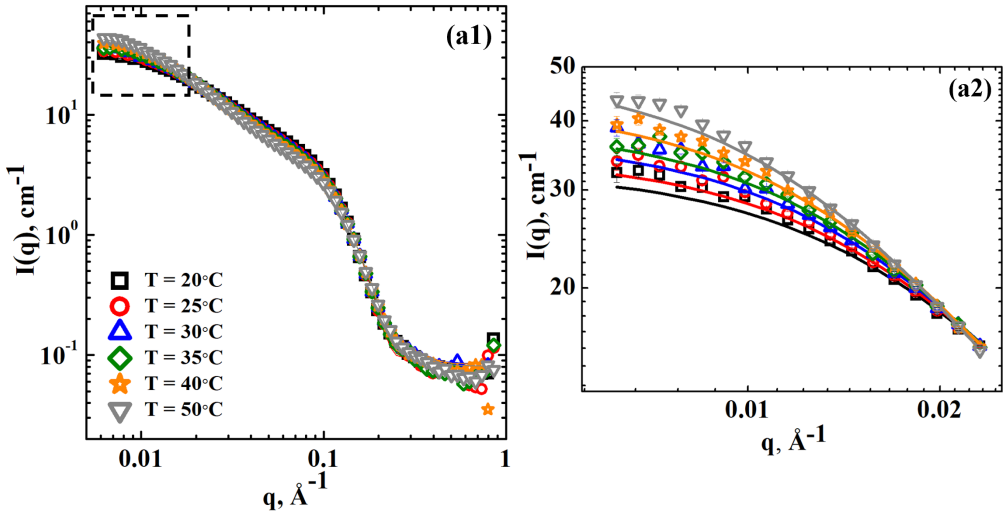

Fig.S 2 (a1): Temperature effect on the nanostructure of D_2O-in-dodecane RMs prepared at $\omega = 10$ and $\Phi = 0.15$ – $I(q)$ vs. q data recorded from SANS experiments. (a2): A magnified version of the $I(q)$ vs. q data in the low q regime. The symbols are the experimental data and the continuous lines visible in the enlarged panels are the model fits as described in the text.

Table.TS 2 The radius (R), polydispersity index of the radius ($R-PDI$), length (L), polydispersity index of the length ($L-PDI$), aspect ratio (AR) and stickiness parameter (τ) for the droplets in the D_2O-in-dodecane RMs prepared at $\omega = 10$ and $\Phi = 0.15$ over a range of temperatures (T) from 20 °C to 50 °C. The goodness of fit is given by the χ^2. These parameters are extracted from the model fits to the experimental SANS data in Figure S2

T (°C)	R (Å)	R-PDI	L (Å)	L-PDI	AR	τ	χ^2
20	15.0 ± 0.04	0.13	134.1 ± 1.6	0.55	4.46	0.194 ± 0.001	14.6
25	14.9 ± 0.04	0.13	141.3 ± 1.6	0.55	4.75	0.186 ± 0.001	13.6
30	14.7 ± 0.04	0.13	146.2 ± 1.9	0.57	4.97	0.177 ± 0.001	15.0
35	14.4 ± 0.04	0.14	149.5 ± 1.8	0.57	5.18	0.168 ± 0.001	11.2
40	14.2 ± 0.04	0.14	150.2 ± 2.3	0.66	5.25	0.161 ± 0.001	11.0
50	13.8 ± 0.05	0.14	145.7 ± 3.0	0.77	5.26	0.146 ± 0.001	9.4

(iii) $I(q)$ vs q from SANS measurements on RMs prepared at $\omega = 10$ and $\Phi = 0.20$

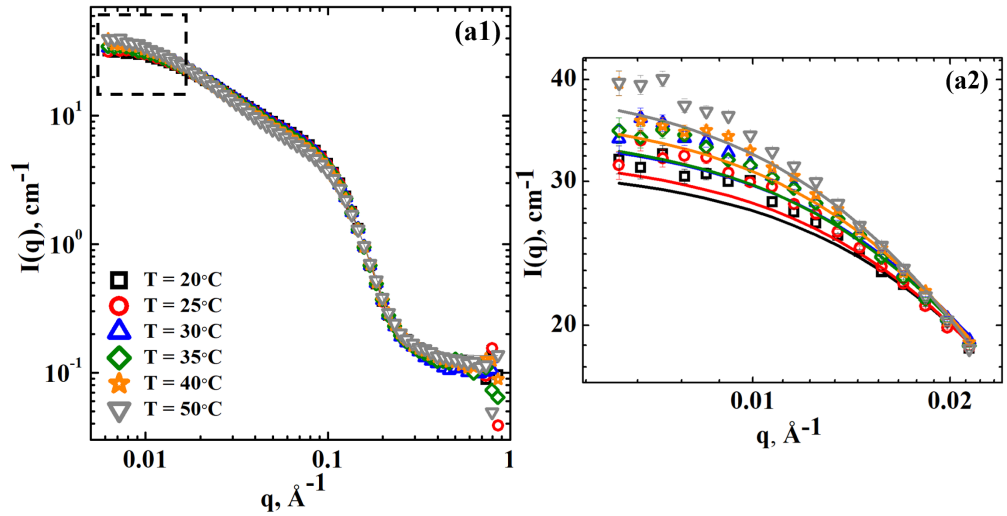

Fig.S 3 (a1): Temperature effect on the nanostructure of D_2O-in-dodecane RMs prepared at $\omega = 10$ and $\Phi = 0.20$ – $I(q)$ vs. q data recorded from SANS experiments. (a2): A magnified version of the $I(q)$ vs. q data in the low q regime. The symbols are the experimental data and the continuous lines visible in the enlarged panels are the model fits as described in the text.

Table.TS 3 The radius (R), polydispersity index of the radius ($R-PDI$), length (L), polydispersity index of the length ($L-PDI$), aspect ratio (AR) and stickiness parameter (τ) for the droplets in the D_2O-in-dodecane RMs prepared at $\omega = 10$ and $\Phi = 0.20$ over a range of temperatures (T) from 20 °C to 50 °C. The goodness of fit is given by the χ^2. These parameters are extracted from the model fits to the experimental SANS data in Figure S3

T (°C)	R (Å)	R-PDI	L (Å)	L-PDI	AR	τ	χ^2
20	14.7 ± 0.03	0.15	128.6 ± 0.8	0.41	4.38	0.202 ± 0.002	16.8
25	14.5 ± 0.03	0.14	130.9 ± 0.8	0.43	4.50	0.197 ± 0.001	21.1
30	14.2 ± 0.03	0.16	134.9 ± 0.8	0.43	4.73	0.186 ± 0.001	19.4
35	14.2 ± 0.03	0.15	135.3 ± 0.8	0.43	4.76	0.182 ± 0.001	16.0
40	14.1 ± 0.03	0.15	137.7 ± 0.9	0.46	4.87	0.175 ± 0.001	17.1
50	13.8 ± 0.04	0.14	142.0 ± 1.0	0.50	5.12	0.163 ± 0.001	15.1

B. RMs of p-xylene + dodecane (1:9)/D_2O/AOT

Effect of variation in ω

$g^1(\tau_d)$ vs τ_d from DLS measurements on RMs prepared using a mixture of p-xylene and dodecane (1:9 volume ratio) at $\Phi = 0.05$ and $T = 25$ °C and $\omega = 10$, 15 and 20.

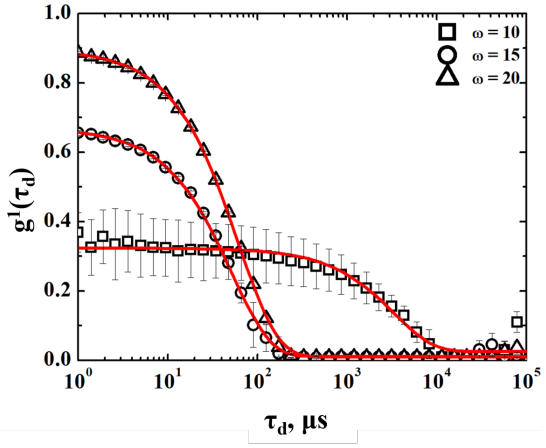

Fig.S 4 Electric field autocorrelation function, $g^1(\tau_d)$ vs delay time, τ_d obtained from DLS experiments on p-xylene+dodecane (1:9)/D_2O/AOT samples prepared at $\Phi = 0.05$ and 25 °C for $\omega = 10$, 15 and 20. The experimental data shown as symbols is fitted to a single exponential function for $\omega = 15$ and 20 while a sum of two exponential functions could be fitted for $\omega = 10$. Note the high error bars for the DLS data at $\omega = 10$.

Nanostructure at dilute Φ

$p(r)$ vs r from SAXS measurements on RMs prepared at $\omega = 10$ and $\Phi = 0.005$, 0.01, 0.02 and 0.03.

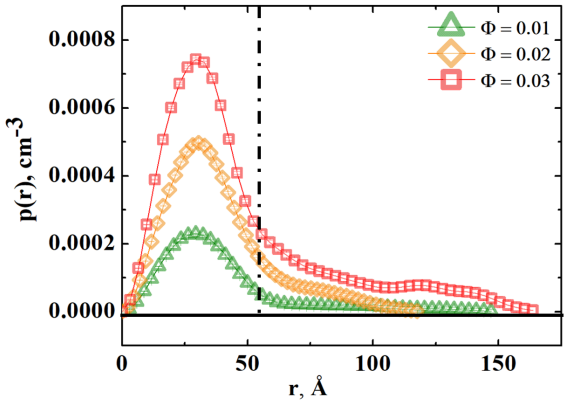

Fig.S 5 The $p(r)$ vs. r obtained by the inverse Fourier transform of SAXS data for D_2O droplets dispersed in a mixture of p-xylene and dodecane (1:9 volume ratio) at $\omega = 10$ and $\Phi = 0.01$, 0.02 and 0.03 at 20 °C. The oscillations at $\Phi = 0.02$ and 0.03, indicate droplet interactions.

Droplet size and interactions at $\Phi \geq 0.05$

$I(q)$ vs q from SANS experiments on RMs prepared at $\omega = 10$ and $\Phi = 0.05$, 0.10, 0.15 and 0.20.

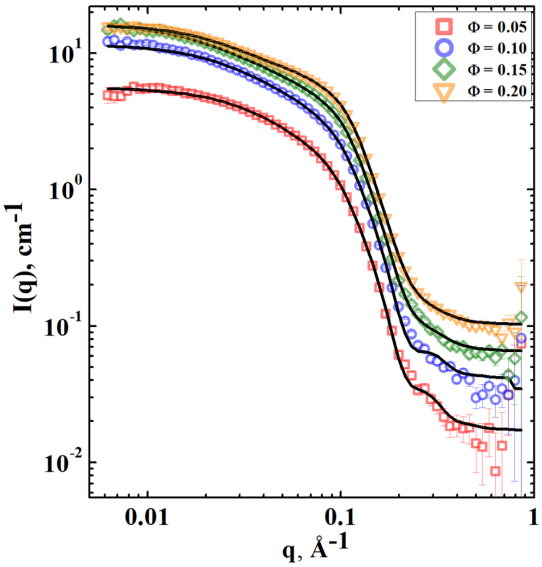

Fig.S 6 $I(q)$ vs. q from SANS measurements on RMs of p-xylene+dodecane (1:9)/D_2O/AOT, prepared at $\omega = 10$ and $\Phi = 0.05$, 0.10, 0.15 and 0.20 at 20 °C. Experimental data is shown as symbols and the continuous lines are the fit to the cylindrical form factor with sticky hard sphere structure factor (including β corrections).

Table.TS 4 The radius (R), polydispersity index of the radius ($R-PDI$), length (L), polydispersity index of the length ($L-PDI$), aspect ratio (AR) and stickiness parameter (τ) for the droplets in RMs of p-xylene+dodecane (1:9)/D_2O/AOT, prepared at $\omega = 10$ and T = 20 °C over a range of Φ from 0.05 – 0.20. The goodness of fit is given by the χ^2. These parameters are extracted from the model fits to the SANS data shown in Figure S6.

Φ	R (Å)	R-PDI	L (Å)	L-PDI	τ	χ^2
0.05	17.3 ± 0.3	0.13	39.3 ± 8.1	0.91	0.291 ± 0.032	1.6
0.10	16.2 ± 0.2	0.14	65.3 ± 7.9	0.76	0.392 ± 0.011	6.7
0.15	15.4 ± 0.06	0.21	66.4 ± 1.9	0.89	2.0 ± 0.001	3.1
0.20	15.1 ± 0.05	0.19	55.3 ± 1.4	0.51	0.682 ± 0.092	15.1

Temperature induced structural changes

(i) $I(q)$ vs q from SANS measurements on RMs prepared at $\omega = 10$ and $\Phi = 0.10$

Table.TS 5 The radius (R), polydispersity index of the radius ($R-PDI$), length (L), polydispersity index of the length ($L-PDI$), aspect ratio (AR) and stickiness parameter (τ) for the p-xylene+dodecane (1:9)/D_2O/AOT RMs prepared at $\omega = 10$ and $\Phi = 0.10$ over a range of temperatures (T) from 20 °C to 50 °C. The goodness of fit is given by the χ^2. These parameters are extracted from the model fits to the experimental SANS data in Figure S7

T (°C)	R (Å)	R-PDI	L (Å)	L-PDI	AR	τ	χ^2
20	16.2 ± 0.2	0.14	65.3 ± 15.7	0.76	2.05	0.392 ± 0.011	6.7
25	15.9 ± 0.2	0.13	70.0 ± 17.7	0.75	2.18	0.334 ± 0.007	5.5
30	15.6 ± 0.1	0.14	75.1 ± 13.5	0.76	2.50	0.296 ± 0.006	5.9
40	15.1 ± 0.1	0.14	89.3 ± 15.1	0.76	3.0	0.258 ± 0.004	6.1
50	14.7 ± 0.2	0.13	102.9 ± 16.9	0.75	3.48	0.235 ± 0.070	4.2

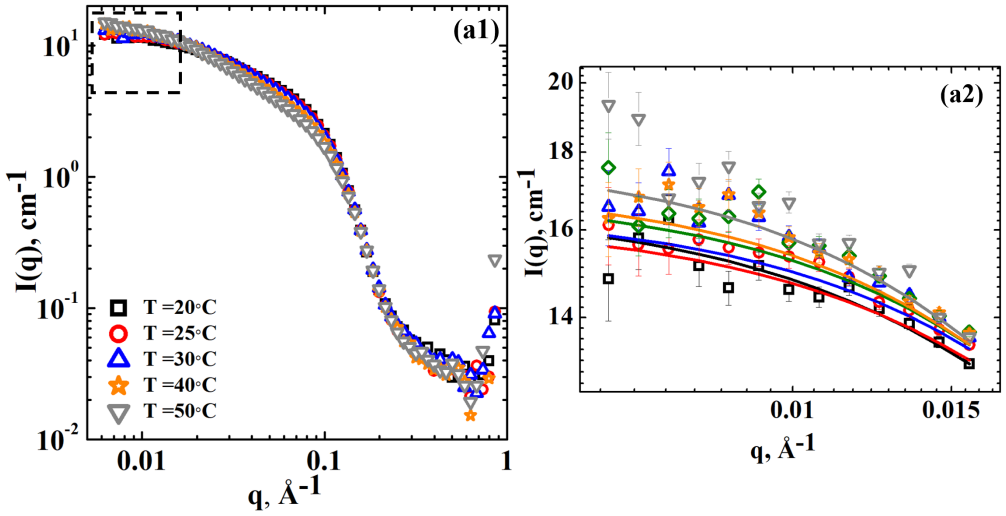

Fig.S 7 (a1): Temperature effect on the nanostructure of RMs of p-xylene + dodecane (1:9)/D_2O/AOT prepared at $\omega = 10$ and $\Phi = 0.10$ – $I(q)$ vs. q data recorded from SANS experiments. (a2): A magnified version of the $I(q)$ vs. q data in the low q regime. The symbols are the experimental data and the continuous lines visible in the enlarged panels are the model fits as described in the text.

(ii) $I(q)$ vs q from SANS measurements on RMs prepared at $\omega = 10$ and $\Phi = 0.15$

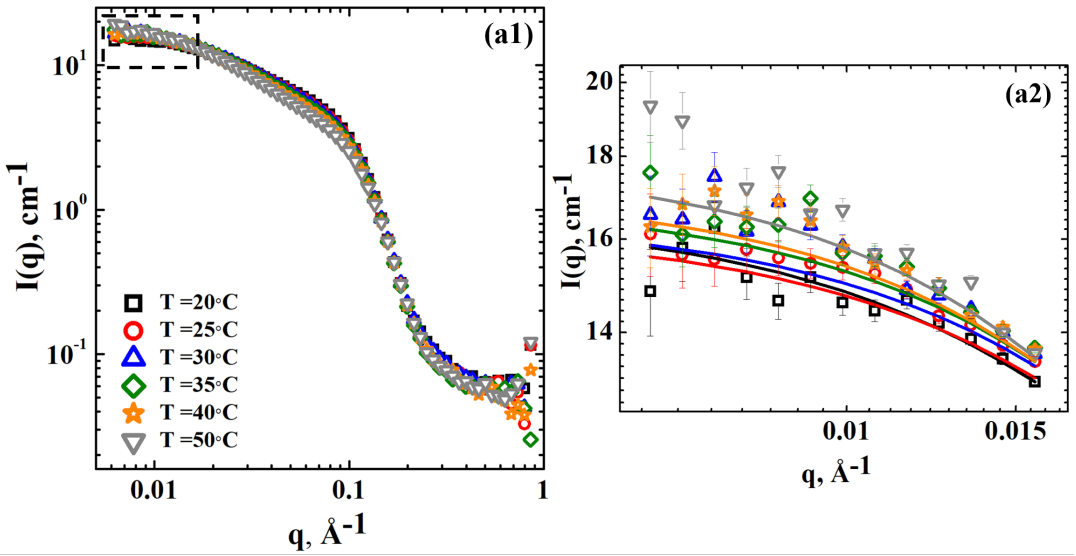

Fig.S 8 (a1): Temperature effect on the nanostructure of RMs of p-xylene + dodecane (1:9)/D_2O/AOT prepared at $\omega = 10$ and $\Phi = 0.15$ – $I(q)$ vs. q data recorded from SANS experiments. (a2): A magnified version of the $I(q)$ vs. q data in the low q regime. The symbols are the experimental data and the continuous lines visible in the enlarged panels are the model fits as described in the text.

Table.TS 6 The radius (R), polydispersity index of the radius ($R-PDI$), length (L), polydispersity index of the length ($L-PDI$), aspect ratio (AR) and stickiness parameter (τ) for the RMs of p-xylene+dodecane (1:9)/D_2O/AOT prepared at $\omega = 10$ and $\Phi = 0.15$ over a range of temperatures (T) from 20 °C to 50 °C. The goodness of fit is given by the χ^2. These parameters are extracted from the model fits to the experimental SANS data in Figure S8

T (°C)	R (Å)	R-PDI	L (Å)	L-PDI	AR	τ	χ^2
20	15.4 ± 0.06	0.21	66.4 ± 1.9	0.89	2.15	2.0 ± 0.001	3.1
25	15.5 ± 0.08	0.14	67.6 ± 3.7	0.89	2.18	0.461 ± 0.018	6.8
30	15.3 ± 0.08	0.15	71.7 ± 3.4	0.58	2.34	0.377 ± 0.077	8.9
35	14.9 ± 0.05	0.15	100.9 ± 2.6	0.57	3.38	0.293 ± 0.003	8.1
40	14.6 ± 0.03	0.15	105.1 ± 2.3	0.56	3.59	0.271 ± 0.002	7.2
50	14.1 ± 0.04	0.15	114.7 ± 2.1	0.54	4.00	0.244 ± 0.002	5.9