Electronic Supplementary Material (ESI) for Soft Matter.

Electronic Supporting Information

Polymerization in Soft Nanoconfinements of Lamellar and Reverse Hexagonal Mesophases

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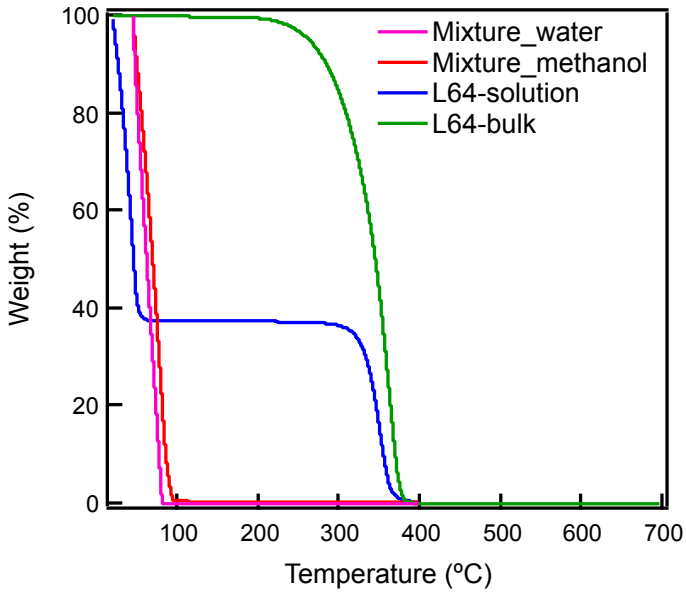

Figure S1. Typical TGA data for soxhlet solvents (water and methanol) after washing polymerized samples. TGA data of Pluornic L64 block copolymer in the bulk state and in aqueous solution are also provided.

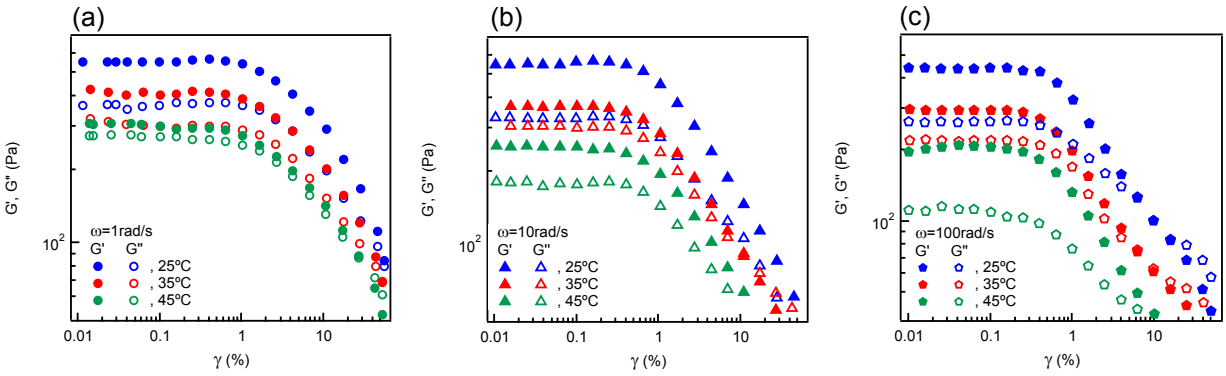

Figure S2. Amplitude sweep data for P84_L_α sample at (a) angular frequency of 1 rad/s and different temperatures, (b) angular frequency of 10 rad/s and different temperatures, and (c) angular frequency of 100 rad/s and different temperatures.

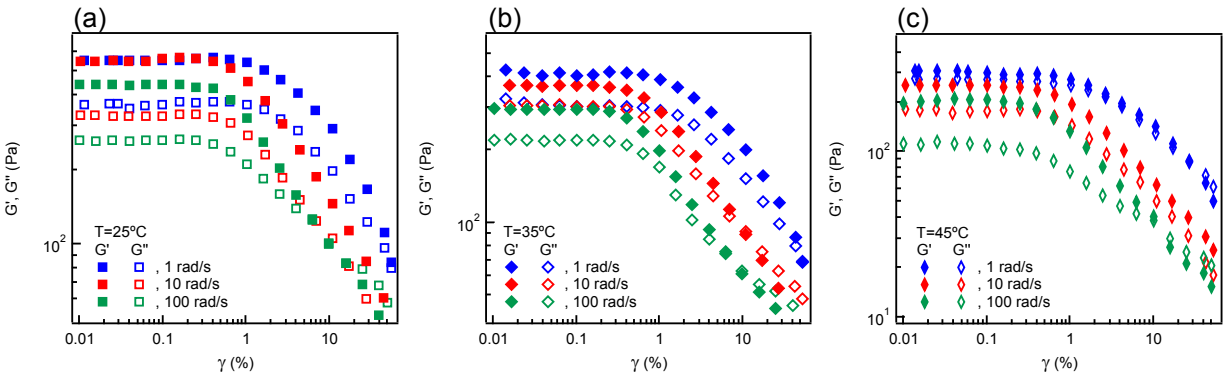

Figure S3. Amplitude sweep data for P84_L_α sample at (a) 25 °C and different angular frequencies, (b) 35 °C and different angular frequencies, and (c) 45 °C and different angular frequencies.

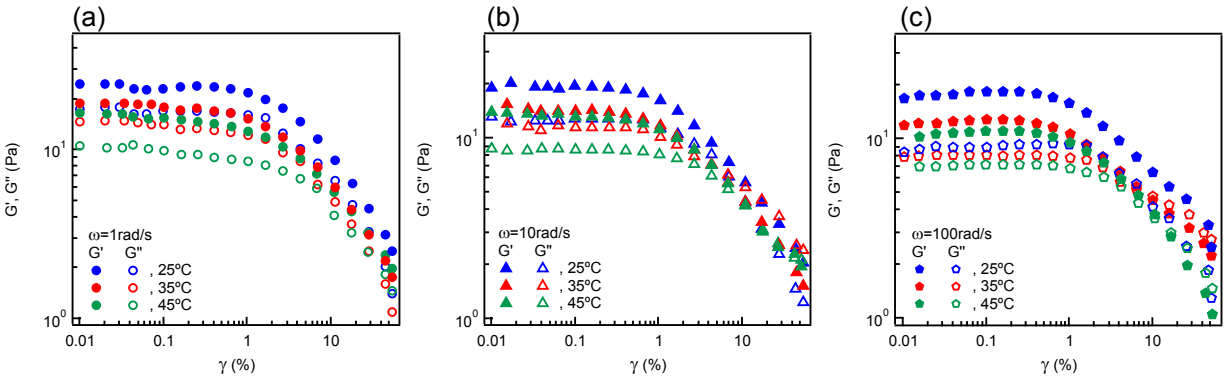

Figure S4. Amplitude sweep data for L121_L_α sample at (a) angular frequency of 1 rad/s and different temperatures, (b) angular frequency of 10 rad/s and different temperatures, and (c) angular frequency of 100 rad/s and different temperatures.

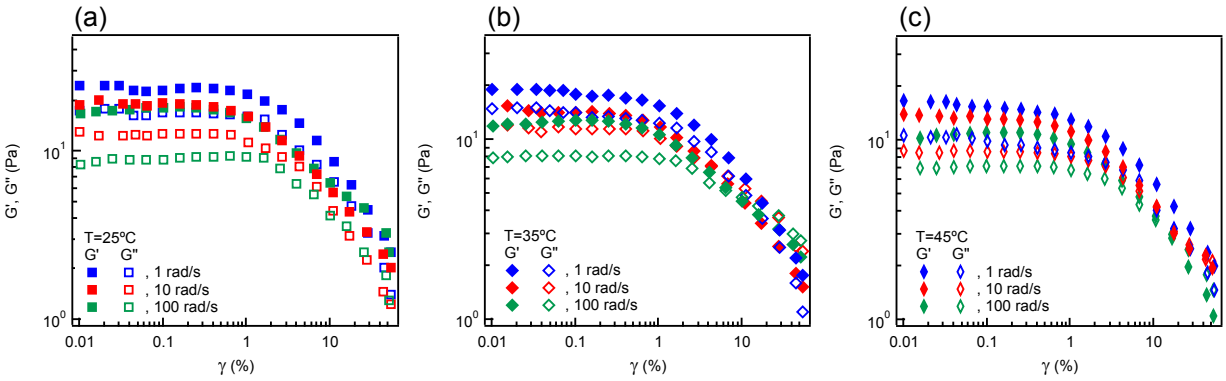

Figure S5. Amplitude sweep data for L121_L_α sample at (a) 25 °C and different angular frequencies, (b) 35 °C and different angular frequencies, and (c) 45 °C and different angular frequencies.

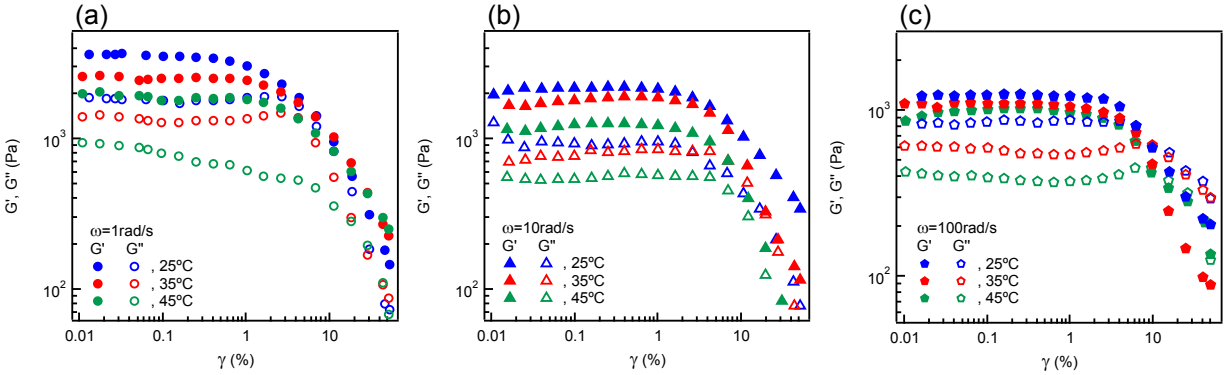

Figure S6. Amplitude sweep data for P84_H_2 sample at (a) angular frequency of 1 rad/s and different temperatures, (b) angular frequency of 10 rad/s and different temperatures, and (c) angular frequency of 100 rad/s and different temperatures.

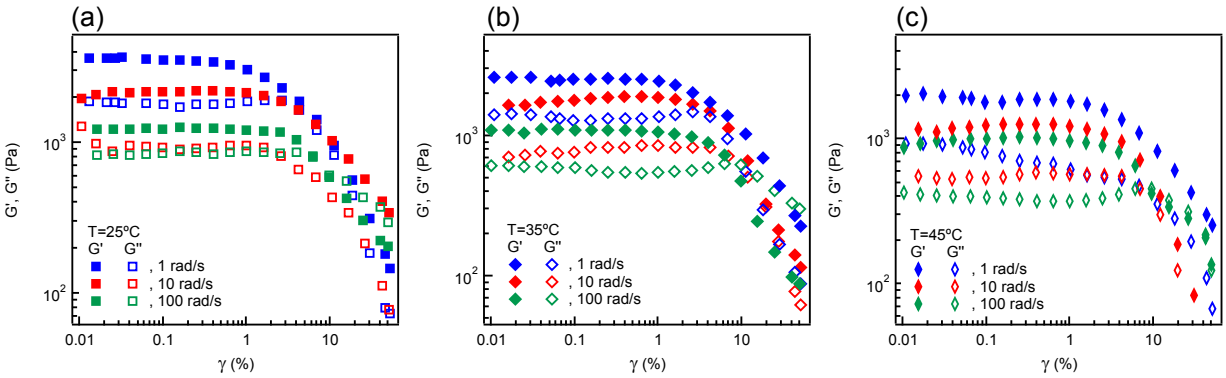

Figure S7. Amplitude sweep data for P84_H_2 sample at (a) 25 °C and different angular frequencies, (b) 35 °C and different angular frequencies, and (c) 45 °C and different angular frequencies.

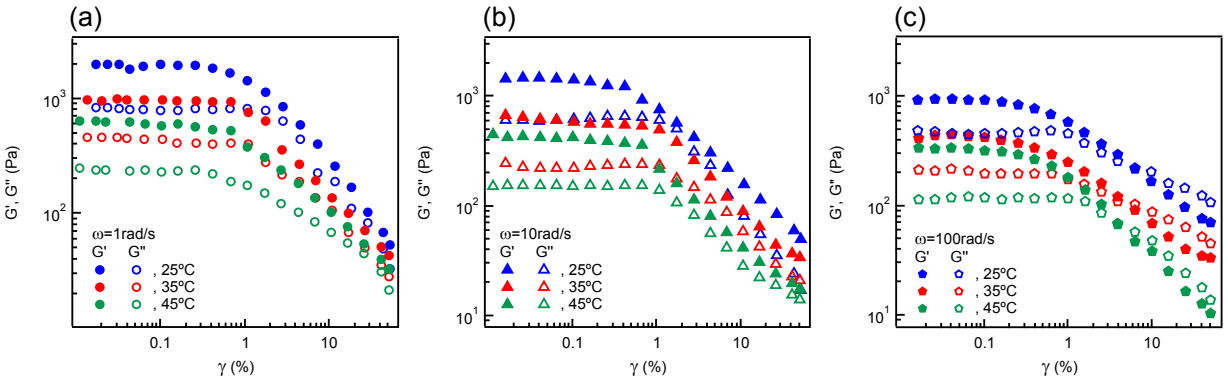

Figure S8. Amplitude sweep data for L64_H_2 sample at (a) angular frequency of 1 rad/s and different temperatures, (b) angular frequency of 10 rad/s and different temperatures, and (c) angular frequency of 100 rad/s and different temperatures.

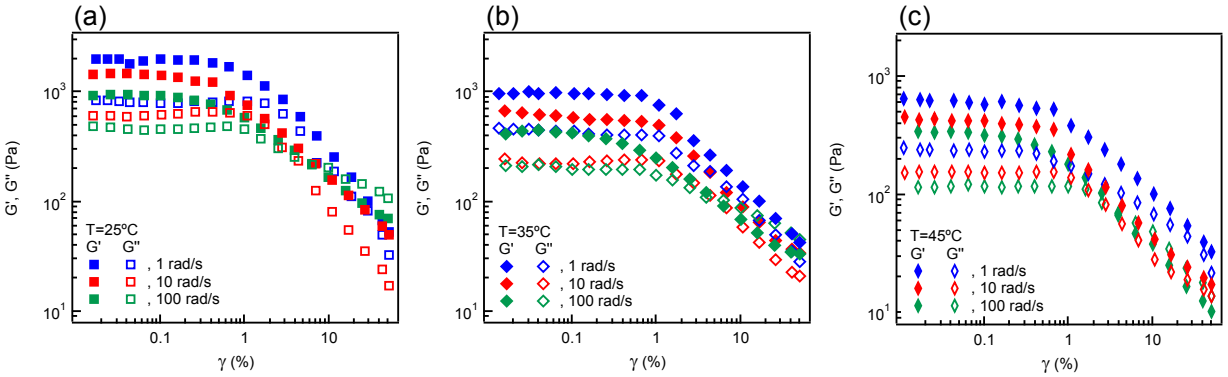

Figure S9. Amplitude sweep data for L64_H_2 sample at (a) 25 °C and different angular frequencies, (b) 35 °C and different angular frequencies, and (c) 45 °C and different angular frequencies.

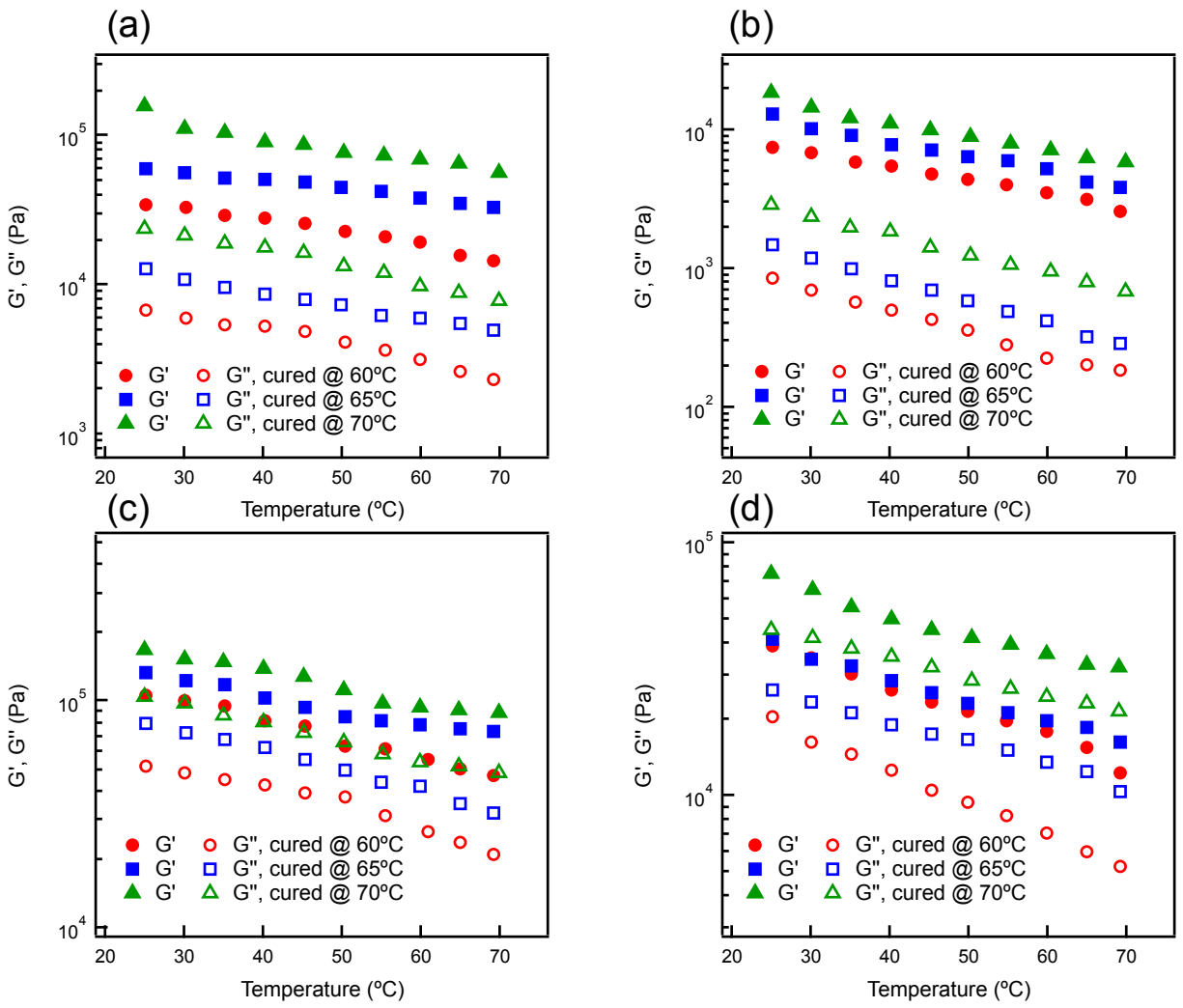

Figure S10. Temperature sweep of dynamic moduli of polymerized mesophases: (a) P84-L_α (60/15/25), (b) L121-L_α (57/18/25), (c) P84-H_2 (40/35/25), and (d) L64-H_2 (55/20/25) samples, cured at different temperatures (shown in the legend).

Calculation of confinement size, $R_{h,\,max}$, in reverse hexagonal samples

As discussed, for reverse hexagonal mesophases, $R_{h,\,max}$ is obtained as follows:

$$R_{h,\,max} = \sqrt{\frac{A_h}{\pi}} \tag{S1}$$

$$A_h = \frac{a^2\sqrt{3}}{4} - \frac{\pi(M_H)^2}{2} \tag{S2}$$

Based on the geometrical analysis:

$$M_H = a\sqrt{\frac{\sqrt{3}}{2\pi}(\varphi_{water} + \varphi_{Pluronic})} \tag{S3}$$

For Pluronic L64, the PPO block constitutes 60 wt% of the block copolymer. Assuming PPO and PEO to be at bulk density (PPO~1.005 g/cm^3 and PEO~1.11 g/cm^3), we can conclude that approximately 62% of polymer volume is the PPO block, while PEO makes up the other 38% of Pluronic L64 volume.[1] Similarly, for Pluronic P84, approximately 61% of polymer volume is the PPO block, while PEO block occupies the remaining 39%.[2] Therefore, the lattice parameter, a, values from SAXS data are 6.6 nm and 7.4 nm for P84-H_2 and L64-H_2 samples, respectively. Volume fractions of water, φ_{water}, and monomer phases, $\varphi_{Monomer}$, in P84-H_2 and L64-H_2 are reported in Table S1.

Table S1. Values of the necessary parameters for calculating $R_{h,\,max}$ in reverse hexagonal samples.

Sample	φ_{water}	$\varphi_{Pluronic}$	M_H, nm	A_h, nm^2	$R_{h,\,max}, nm$
P84-H_2	0.35	0.38	3.0	5.5	1.3
L64-H_2	0.2	0.52	3.3	7.1	1.5

References

(1) Alexandridis, P.; Olsson, U.; Lindman, B. Self-Assembly of Amphiphilic Block Copolymers: The (EO)13(PO)30(EO)13-Water-p-Xylene System1 P. Alexandridis, U. Olsson, and B. Lindman, Macromolecules 28, 7700 (1995). *Macromolecules* **1995**, *28* (23), 7700–7710.

(2) Alexandridis, P.; Olsson, U.; Lindman, B. A Record Nine Different Phases (Four Cubic, Two Hexagonal, and One Lamellar Lyotropic Liquid Crystalline and Two Micellar Solutions) in a Ternary Isothermal System of an Amphiphilic Block Copolymer and Selective Solvents (Water and Oil). *Langmuir* **1998**, *14* (10), 2627–2638.