Electronic supplementary information

Thermo-microscopy

Fig. S1. shows thermo- microscopy images of PBS-PF2T mixed with aqueous 680 mM $C_{12}E_4$.

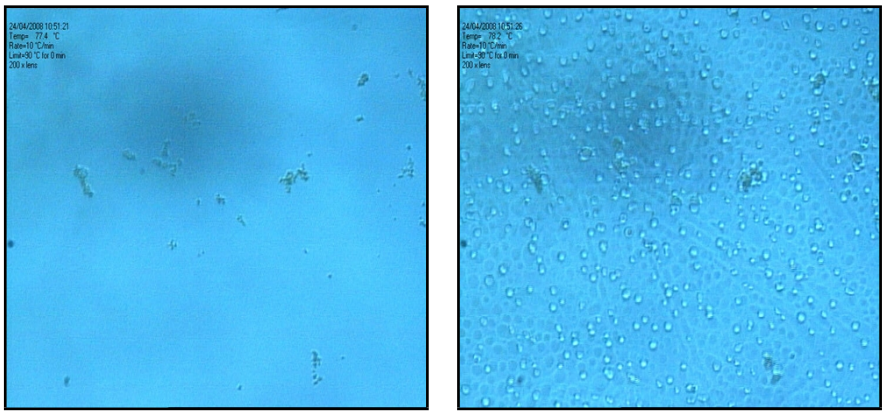

Fig. S1. Thermo-microscopy images of PBS-PF2T mixed with aqueous 680 mM $C_{12}E_4$, showing the phase transition from the lamellar phase to the coexistence of water and liquid surfactant solution observed at 78 ºC.

Photoabsorption

Fig. S2 plots the fluorescence spectra of PBS-PF2T mixed with aqueous 680 mM $C_{12}E_4$ in thin wet films for selected temperatures.

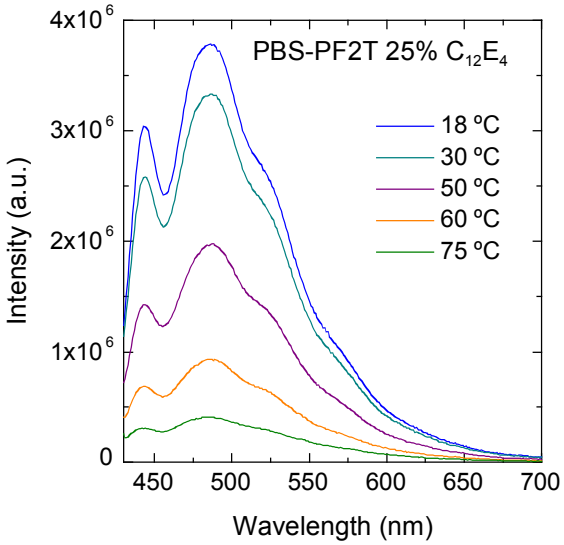

Fig. S2. Fluorescence spectra of ~12 mM PBS-PF2T mixed with 680 mM aqueous $C_{12}E_4$ at selected temperaterus in thin wet films.

GISAXS

Fig. S3. shows GISAXS data of parallel sample to the one whose data are shown in Fig. 8.

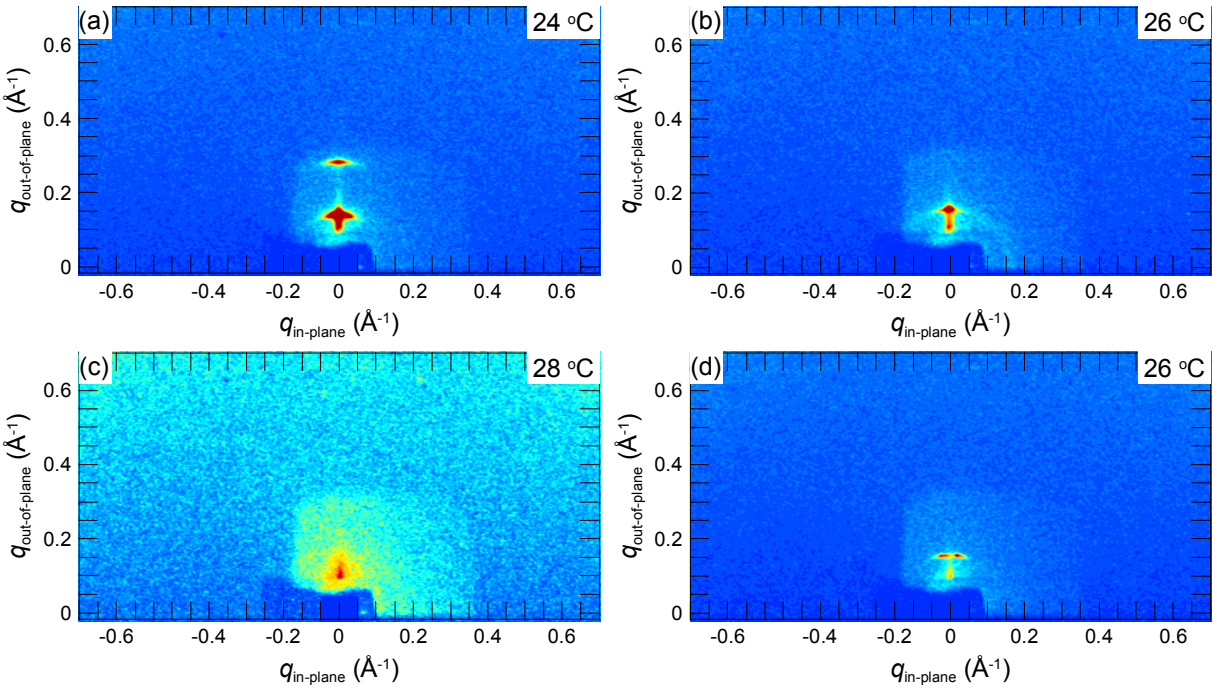

Fig. S3. GIWAXS patterns of ~12 mM PBS-PF2T polymer mixed with 680 mM $C_{12}E_4$ aqueous surfactant during a heating-cooling cycle. The relative atmospheric humidity was 100 %. The temperatures (a-d) were 24 °C, 26 °C, 28 °C and 26 °C, respectively.

Determination of cell specifications

The number of $C_{12}E_4$ molecules required to fill 680 mM of the cell of dimension 10 nm × 10 nm × 10 nm was determined by calculating the weight of the cell containing the two equivalents of PBS-PF2T and the rest of the volume of the cell is filled with water (2 equivalents of PBS-PF2T and 29744 H_2O molecules had a total weight 540104 gmol^{-1}) it could then be calculated that, in order for 680 mM of this volume to contain non-ionic surfactant, 373 equivalents of $C_{12}E_4$ needed to be added (540104 × 0.25 = 135026 gmol^{-1} → 135026/362 gmol^{-1} = 373 equivalents of $C_{12}E_4$).

Figs. S4-S6 show, respectively, simulation cells at 20 ns of ten equivalents of PBS-PF2T at 25°C, 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 70°C and 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 90°C. The essential parameters are given in Table S1. Figs. S7-S11 illustrate molecular interactions.

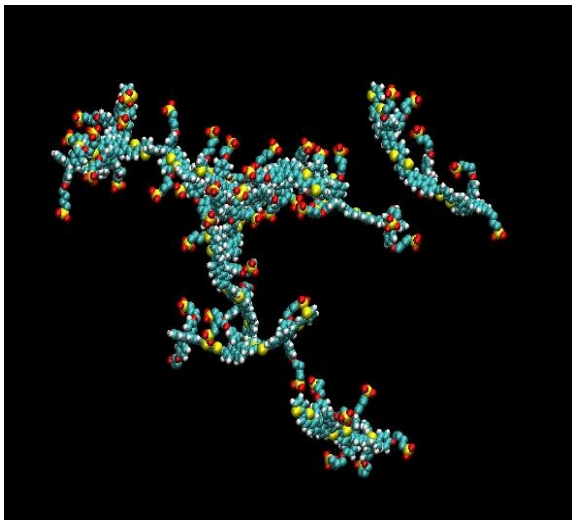

Fig S4. Simulation cell at 20 ns of ten equivalents of PBS-PF2T at 25°C (water molecules omitted for clarity)

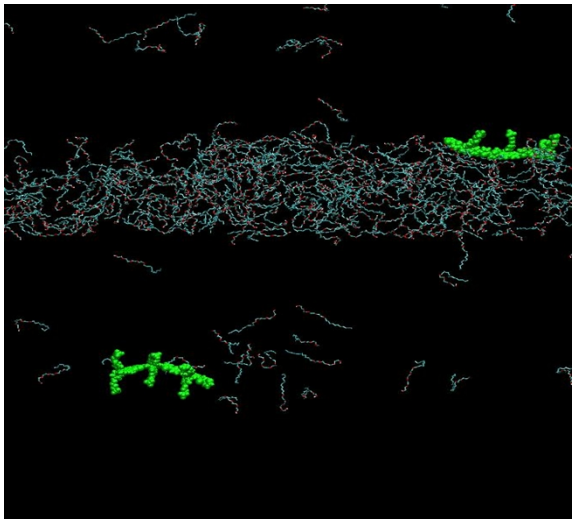

Fig S5. Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 70°C (PBS-PF2T shown in green and water molecules omitted for clarity)

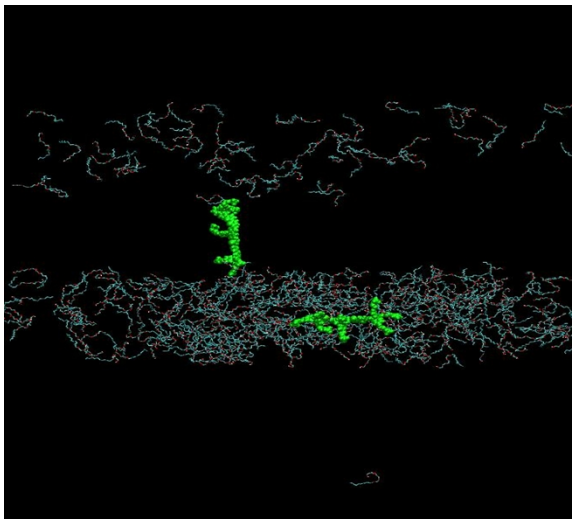

Fig S6. Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 90°C (PBS-PF2T shown in green and water molecules omitted for clarity)

Table S1. Showing the calculated minimum distances in the first and final frames of the simulation demonstrating the closer proximity of the side chains with the solvent and also the backbone with the surfactant. Distances were calculated using the g_mindist command in gromacs.

	10°C		20°C		45°C		70°C		90°C	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Side Chains – Solvent	1.67	1.62	1.67	1.62	1.67	1.60	1.67	1.59	1.67	1.61
Side chains – Surfactant	3.28	2.20	3.28	3.20	3.28	2.81	3.28	2.47	3.28	3.85
Backbone – Solvent	1.99	2.02	1.99	1.99	1.99	1.93	1.99	2.06	1.99	1.93
Backbone- Surfactant	2.92	2.00	2.92	2.15	2.92	2.13	2.92	2.51	2.92	2.27

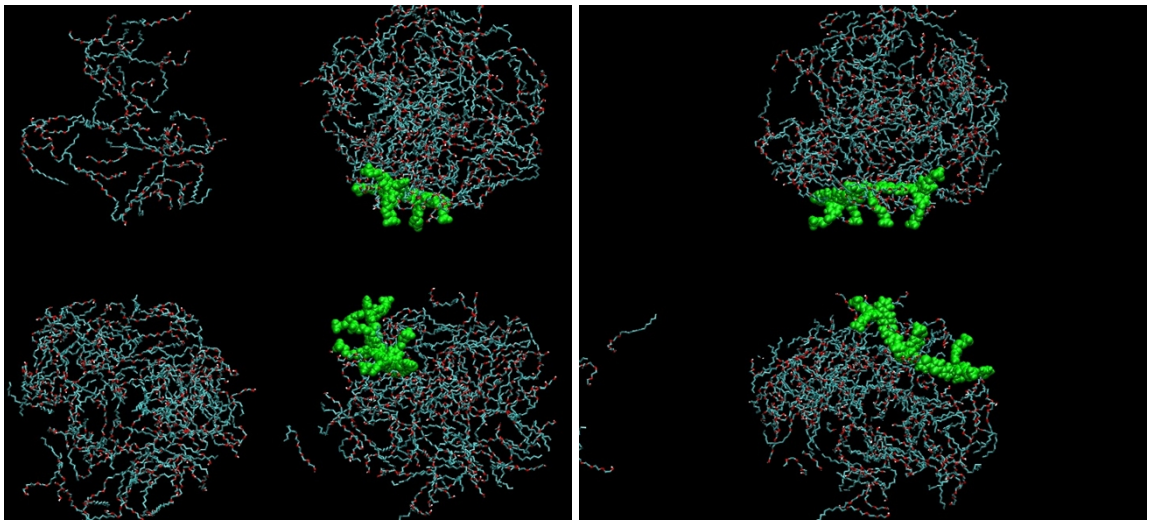

Fig S7 Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 10°C, two different views showing side chain/solvent and polymer backbone/surfactant interactions (PBS-PF2T shown in green and water molecules omitted for clarity)

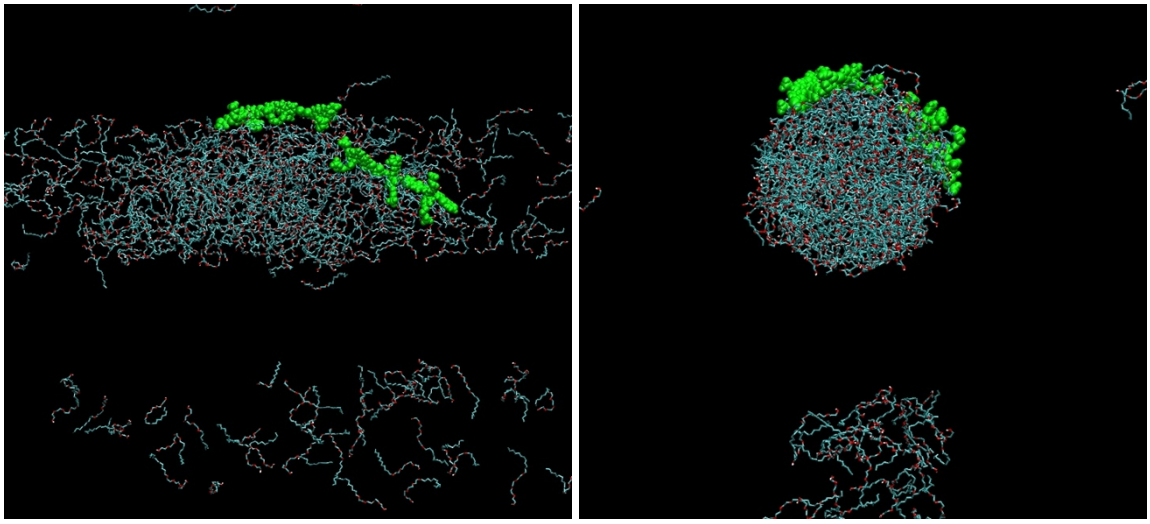

Fig S8 Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 20°C, two different views showing side chain/solvent and polymer backbone/surfactant interactions (PBS-PF2T shown in green and water molecules omitted for clarity)

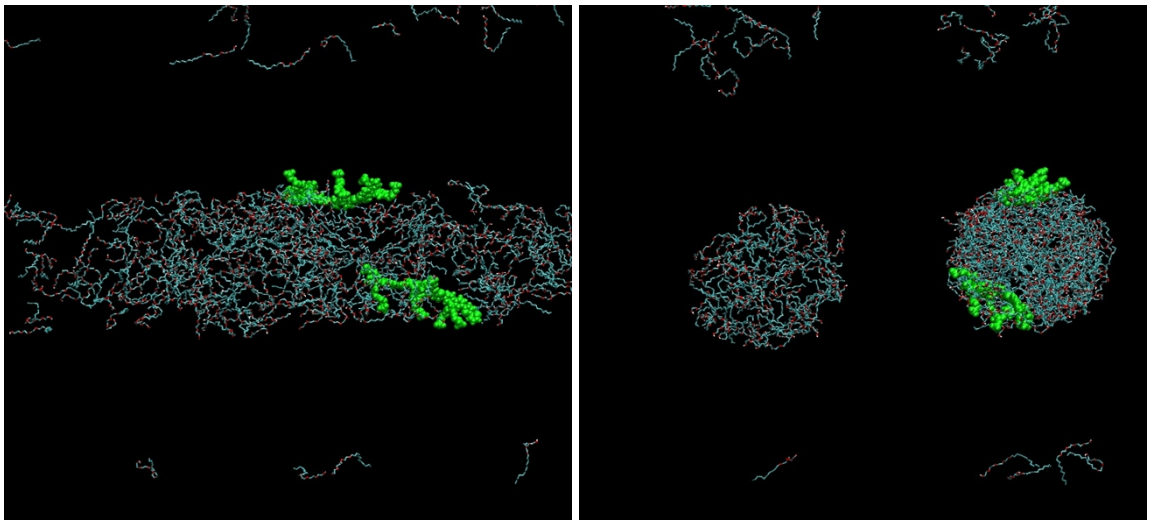

Fig S9 Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 45°C, two different views showing side chain/solvent and polymer backbone/surfactant interactions (PBS-PF2T shown in green and water molecules omitted for clarity)

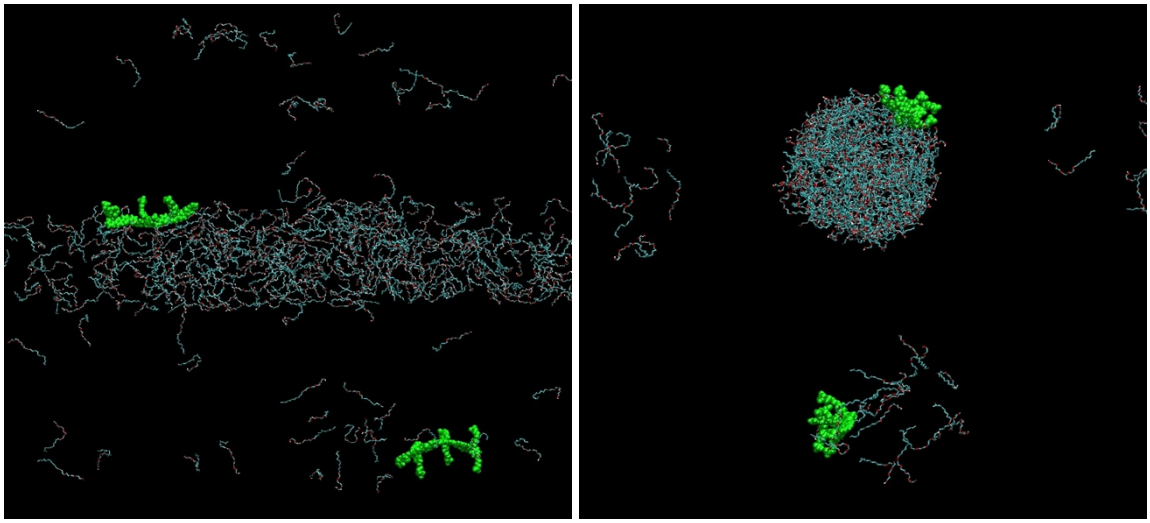

Fig S10 Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 70°C, two different views showing side chain/solvent and polymer backbone/surfactant interactions (PBS-PF2T shown in green and water molecules omitted for clarity)

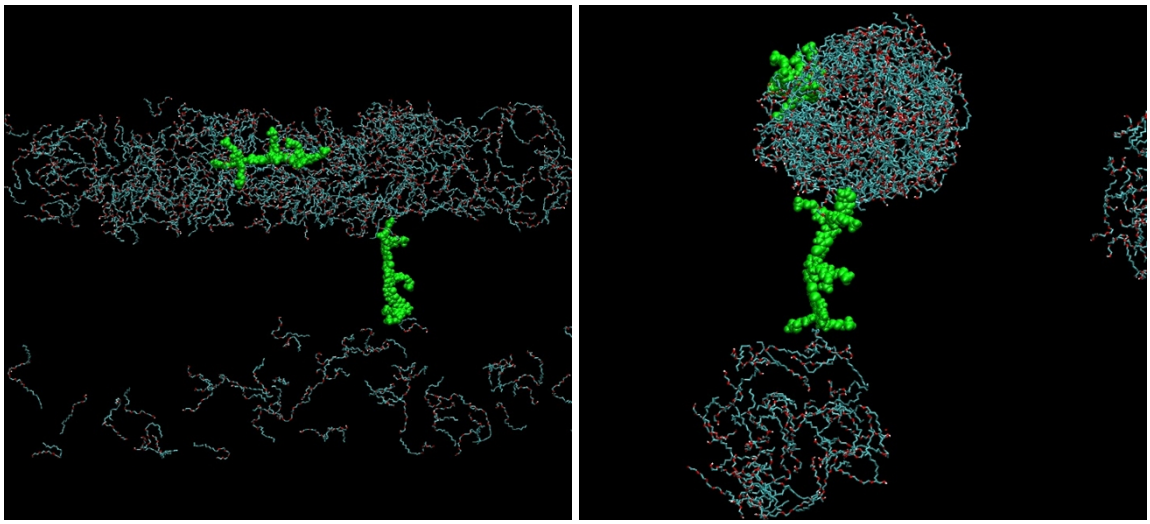

Fig S11 Simulation cell at 20 ns of 680 mM $C_{12}E_4$ with two equivalents of PBS-PF2T at 90°C, two different views showing side chain/solvent and polymer backbone/surfactant interactions (PBS-PF2T shown in green and water molecules omitted for clarity)