

Supplementary Data

pH-Switchable Wormlike Micelles

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A novel pH-switchable wormlike micellar system was prepared by mixing *N*-erucamidopropyl-*N,N*-dimethylamine and maleic acid with molar ratio of **2:1**. Viscosity of the micellar solution is switchable via tuning the pH through the addition of minor acid or base. Such a system **possesses** characteristics of facile, rapid, cost-effective reversible process and **recyclable** cheaper materials.

Experimental Section

Materials. *N*-erucamidopropyl-*N,N*-dimethylamine with purity greater than 99.0 % (HPLC) was synthesized previously;¹ maleic acid (Fluka, ≥ 99.0 %, HPLC) was used without further purification. The water used in the experiments was triply distilled by a quartz water purification system. The wormlike micellar system was prepared by adding 50 mmol UC₂₂AMPM and 25 mmol maleic acid to 1 L distilled water followed by mechanical agitation for several minutes, and then left at room temperature for about 1 day prior to measurements. pH of the solutions was altered by addition of NaOH and/or HCl aqueous solutions (one or several drops) and determined by a Sartorius basic pH meter PB-10 (± 0.01).

Rheology. Rheological experiments were taken on a Physica MCR 301 (Anton Paar, Austria) rotational rheometer equipped with concentric cylinder geometry CC27 (ISO3219) with measuring bob radius 13.33 mm, measuring cup radius 14.46 mm.² Samples were equilibrated at 25 °C for no less than 20 min prior to experiments. Dynamic frequency spectra were conducted in the linear viscoelastic regimes, as determined from dynamic stress sweep measurements. All the experiments were carried out using stress-controlled mode, and CANNON standard oil was used to calibrate the instrument before the measurements. The temperature was set to ± 0.01 °C in accuracy by Peltier temperature control device, and a solvent trap was used to minimize water evaporation during the measurements.

Cryo-TEM. Cryo-TEM observations of the solutions were prepared in a controlled environment vitrification system. The climate chamber temperature was 25–28 °C, and the relative humidity was kept close to saturation to prevent evaporation from the sample during preparation. 5 μ L of solution samples at room temperature was placed on a carbon-coated holey film supported by a copper grid, and gently blotted with filter paper to obtain a thin liquid film (20–400 nm) on the grid. The grid was quenched rapidly into liquid ethane at -180 °C and then transferred into liquid nitrogen (-196 °C) for storage. Then the vitrified specimen stored in liquid nitrogen was transferred into a JEM2010 cryo-microscope using a Gatan 626 cryo-holder and its workstation. The acceleration voltage was 200 kV, and the working temperature was kept below -170 °C. The images were recorded digitally with a charge-coupled device camera (Gatan 832) under low-dose conditions with an under-focus of approximately 3 μ m.²

Additional Results

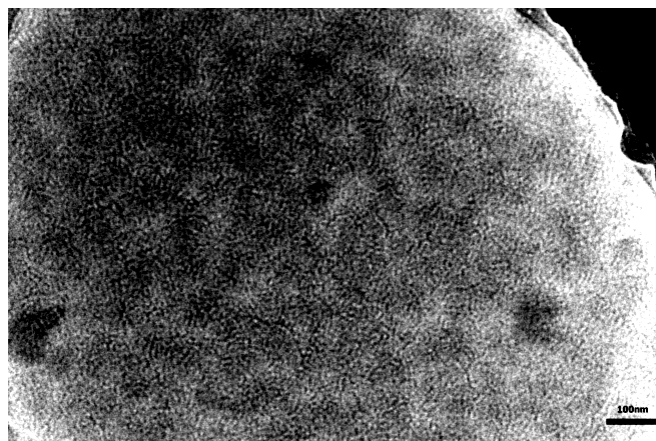


Fig. S1A

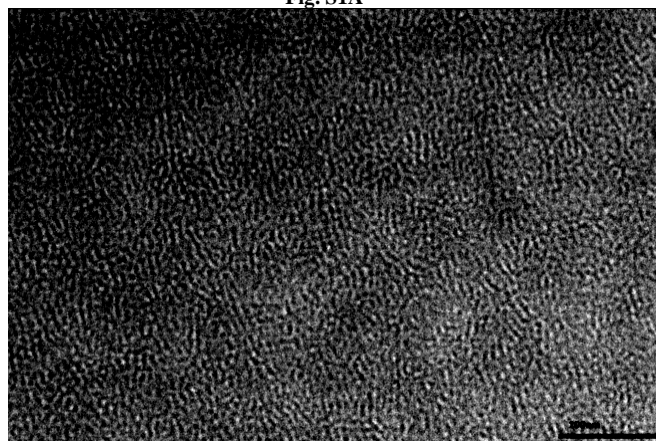


Fig. S1B

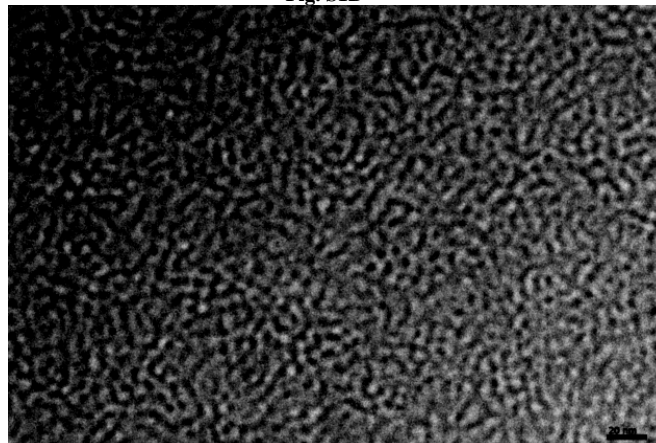


Fig. S1C

Fig. S1 Additional images of Cryo-TEM observations of the wormlike micelles “50 mM UC₂₂AMPM + 25 mM

maleic acid" at room temperature with pH of 6.20. Bars in A, B and C are 100, 100 and 20 nm respectively.

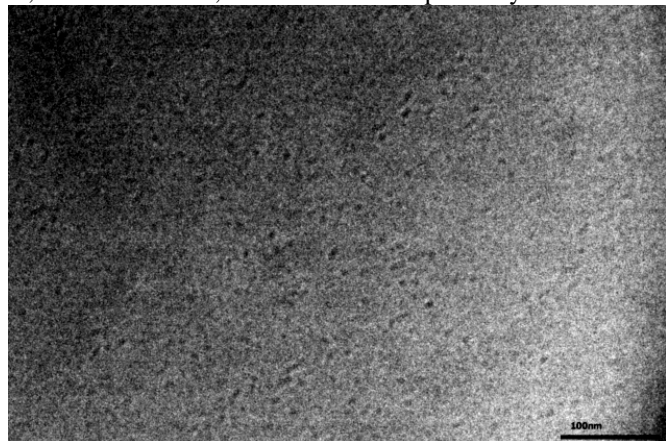


Fig. S2A

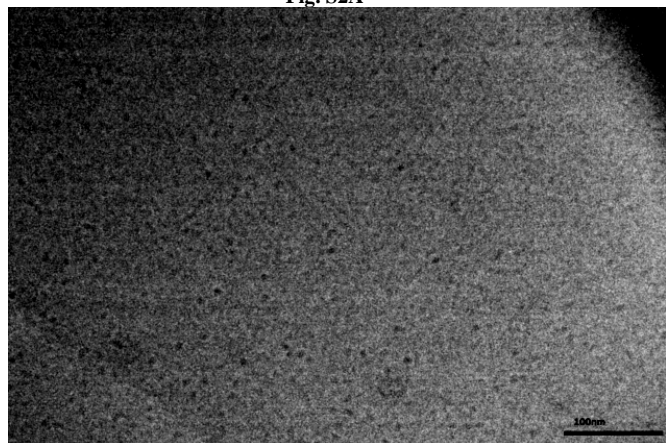


Fig. S2B

Fig. S2 Additional images of Cryo-TEM observations of the wormlike micelles "50 mM UC₂₂AMPM + 25 mM maleic acid" at room temperature with pH of 7.29. Bars in A, and B are 100 nm.

Notes and references

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- 1 Z. Chu and Y. Feng, *Synlett*, 2009, **(16)**, 2655.
- 2 Z. Chu, Y. Feng, X. Su and Y. Han, *Langmuir*, 2010, **26**, 7783.