

1 **Annular and threadlike wormlike micelles formed by a bio-based surfactant containing an**  
2 **extremely large hydrophobic group**

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8 **1. Method**

9 **1.1 Surface Tension**

10 The surface tension of C<sub>12</sub>-MPA-Na was detected at 25 °C through a Sigma701 Automatic Surface  
11 Tensiometer (KSV, Finland) equipped with a Wilhelmy plate T107, and width of the plate is 19.44 mm, thickness  
12 is 0.1 mm, height is 65 mm and circumference is 39.08. The concentration of C<sub>12</sub>-MPA-Na was gradually  
13 increased by dropping mother liquid using a dispenser (TITRONIC universal, Schott, Germany) into the  
14 measurement cell. The surface tension was automatically recorded by software and each concentration of C<sub>12</sub>-  
15 MPA-Na aqueous solution was repeatedly tested three times, and the measurement error for each point is set to  
16 0.05 mN·m<sup>-1</sup>. All data were obtained from the One Attention software.

17 **1.2 Fluorescent intensity**

18 The fluorescence intensity of Nile red (NR) which is fluorescence probe in the solution of surfactant was  
19 measured on a LS-55 spectrofluorometer (PerkinElmer, PE) at 25±0.1 °C controlled by thermostated cell holder  
20 using 1 cm path length quartz cuvettes. The concentration of NR was controlled to 1.0 μmol·L<sup>-1</sup> by adding a  
21 suitable amount of 1.0 mmol·L<sup>-1</sup> methanol stock solution of NR. A series of C<sub>12</sub>-MPA-Na solutions were prepared  
22 and then all the solutions were oscillated for 24 h after ultra-sonication for 2 h. The parameter was set as follow  
23 Excitation wavelength (540 nm); Excitation slit (3 nm); Emission slit (3 nm) and Scan speed (250 nm·min<sup>-1</sup>).

24 **1.3 Size Measurement**

25 A series of C<sub>12</sub>-MPA-Na solutions at desired concentration were prepared and then all the solutions remain  
26 for 24 h at 25±0.1 °C. The size measurement was performed on Malvern nanometer particle-size analyzer (Malvern  
27 Instruments Ltd., Worcestershire, UK) equipped with 1 cm path length quartz cuvettes.

28 **2. Results and discussion**

29 **2.1 <sup>1</sup>H NMR N-dodecyl-maleimidepimaric (C<sub>12</sub>-MPA)**

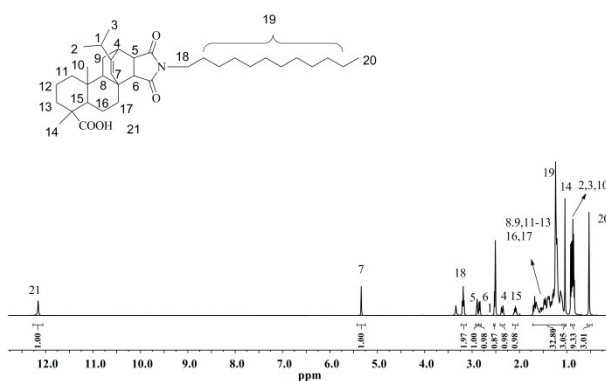
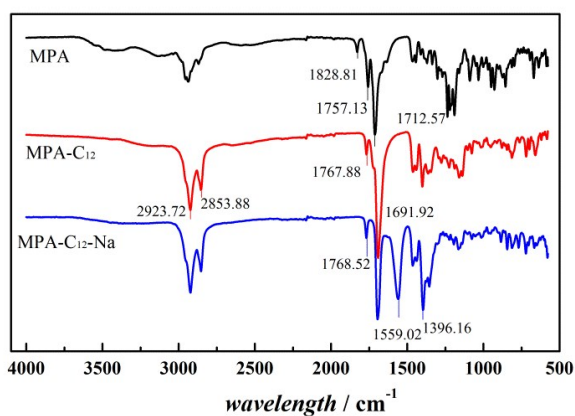


Fig. S1.  $^1\text{H}$  NMR spectrum of  $\text{C}_{12}$ -MPA

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### 3 2.2 FT-IR spectrum

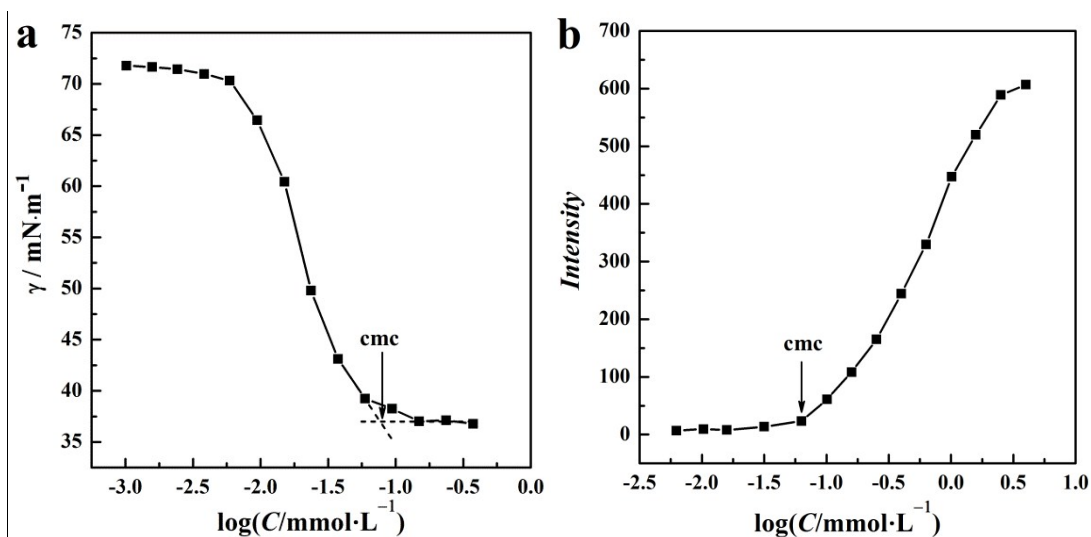


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Fig. S2. FT-IR spectrum of MPA,  $\text{C}_{12}$ -MPA and  $\text{C}_{12}$ -MPA-Na

### 6 2.3 Critical micelle concentration (cmc)



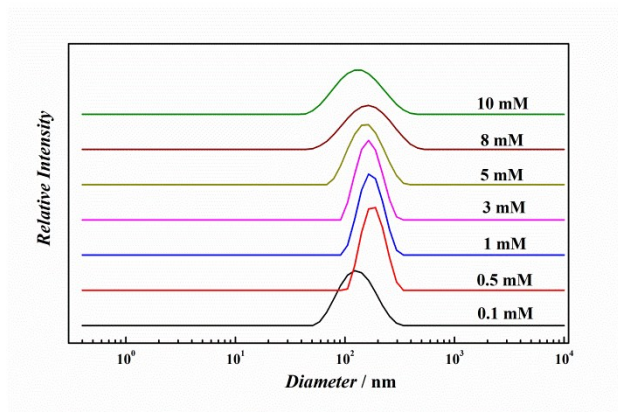
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8 Fig. S3. Variation of surface tension (a) and fluorescent intensity of NR (b) for  $\text{C}_{12}$ -MPA-Na aqueous solutions

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with concentration at 25 °C

### 10 2.4 size distributions

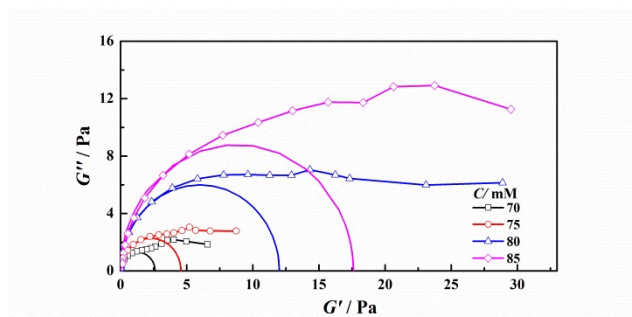


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Fig. S4. The size distributions of C<sub>12</sub>-MPA-Na at different concentration

3 2.5 Cole–Cole curve

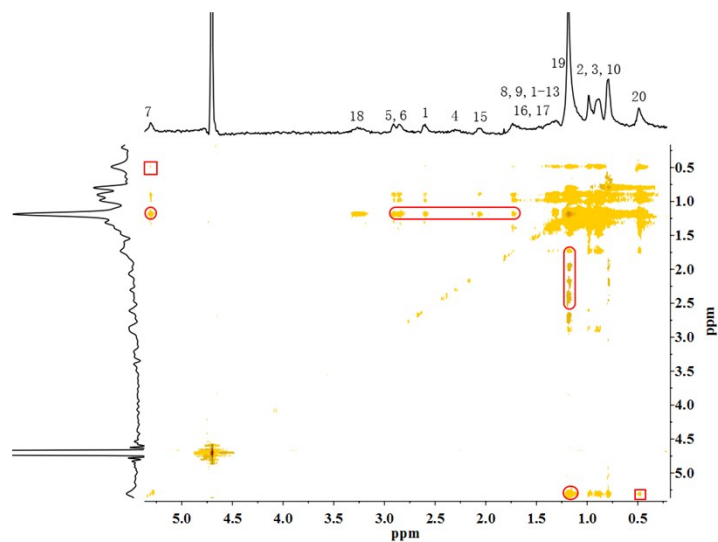


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Fig. S5. The Cole-Cole plots of the solution of C<sub>12</sub>-MPA-Na

6 2.6 <sup>1</sup>H-<sup>1</sup>H 2D NOESY spectra



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Fig. S6. <sup>1</sup>H-<sup>1</sup>H 2D NOESY spectra of the aqueous solution of C<sub>12</sub>-MPA-Na (5 mM)