

## Supplementary Data

# Amidosulfobetaine Surfactant Gels with Shear Banding Transitions

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## 1 Experimental Section

**1.1 Materials.** Surfactant EDAS (molecular formula  $C_{30}H_{60}N_2O_4S$ ; molecular weight 544.87) with purity greater than 99.5% was synthesized previously (Z. Chu, Y. Feng, *Synlett*, 2009, (16), 2655–2658). The NaCl used in the experiments was analytical grade, and the water was triply distilled with a quartz water-purification system. Sample solutions were prepared by adding desinged amount of EDAS powders into 0.5 M NaCl aqueous solution, followed by mild heat at 40–50 °C until the surfactant was solubilized completely, and were then left at room temperature for 2 days prior to the measurements.

	1  4 Pts. ⌚ 2000..800 s	2  20 Pts. ⌚ 800..1 s
Rotation $\dot{\gamma}, n, \varphi, \gamma$	$\dot{\gamma}$ 1E-4..1E-3 1/s	$\dot{\gamma}$ 1E-3..1000 1/s
Rotation $\tau, M$		
Oscillation $\varphi, \gamma$		
Oscillation $\tau, M$		
T		T 30 °C

Fig. S1A

	1  30 Pts.
Rotation $\dot{\gamma}, n, \varphi, \gamma$	
Rotation $\tau, M$	
Oscillation $\varphi, \gamma$	
Oscillation $\tau, M$	$\tau$ 6 Pa $\omega$ 0.01..100 1/s
T	T 30 °C

Fig. S1B

**Fig. S1** Measuring parameters setting of the steady (S1A) and dynamic (S1B) rheological experiments for the 100 mM EDAS sample solution at 30 °C.

	1  5 Pts. ⌚ 4000..1000 s	2  23 Pts. ⌚ 1000..1 s
Rotation $\dot{\gamma}, n, \varphi, \gamma$	$\dot{\gamma}$ 1E-4..1E-3 1/s	$\dot{\gamma}$ 2E-3..1000 1/s
Rotation $\tau, M$		
Oscillation $\varphi, \gamma$		
Oscillation $\tau, M$		
T	T 30 °C	T 30 °C

Fig. S2A

	1  30 Pts.
Rotation $\dot{\gamma}, n, \varphi, \gamma$	
Rotation $\tau, M$	
Oscillation $\varphi, \gamma$	
Oscillation $\tau, M$	$\tau$ 35 Pa $\omega$ 0.01..100 1/s
T	T 30 °C

Fig. S2B

**Fig. S2** Measuring parameters setting of the steady (S2A) and dynamic (S2B) rheological experiments for the 250 mM EDAS sample solution at 30 °C.

**1.2 Rheology.** Rheological experiments were taken on a Physica MCR 301 (Anton Paar, Austria) rotational rheometer equipped with concentric cylinder geometry CC17 (ISO3219). CANNON standard oil was used to calibrate the instrument before the measurements. Samples were equilibrated at 30 °C for no less than 20 min prior to experiments. Dynamic frequency spectra were conducted in the linear viscoelastic regimes. The temperature was set to  $30 \pm 0.01$  °C in accuracy by Peltier temperature control device, and a solvent trap was used to minimize water evaporation during the measurements. The measurement parameters for rheological experiments were optimized—the experiments were taken at steady conditions. The measuring settings for steady and dynamic rheological experiments are shown in Fig. S1 and S2.

**1.3 Flow Visualization.** Optical images of sheared 250 mM EDAS solution at 30 °C were recorded on a visualization rheometer (CSS 450 Optical Rheology System, Linkam Scientific Instruments Ltd) with fixed top plate and rotatable bottom plate. The sample was illuminated from the bottom plate using a halogen light source, and optical images of sheared solution were recorded using a Sony CCD Camera fixed above the top plate.

## 2 Additional Results

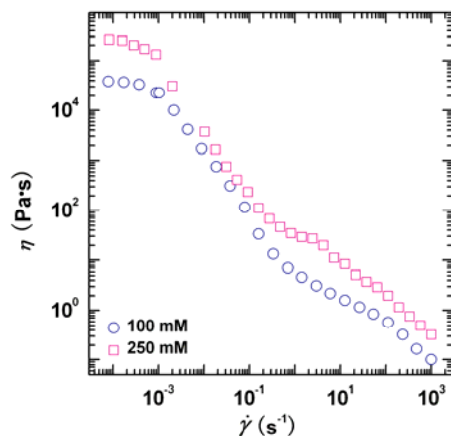


Fig. S3 Shear viscosity plotted as a function of shear rate for the 100 and 250 mM EDAS sample solutions at 30 °C.

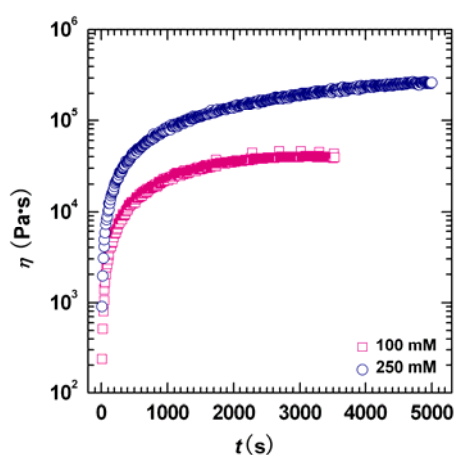


Fig. S4 Time dependence of shear viscosity at shear rate of  $0.0001 \text{ s}^{-1}$  for the 100 and 250 mM EDAS sample solutions at 30 °C.

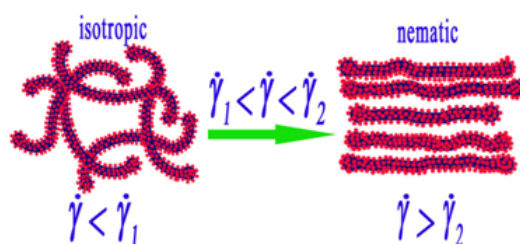


Fig. S5 Schematic illustration of micellar structural changes induced by shear banding transition.