

Supporting Information

**Thermo-Responsive Pickering Emulsions Stabilized by Silica  
Nanoparticles in Combination with Alkyl Polyoxyethylene Ether  
Nonionic Surfactant**

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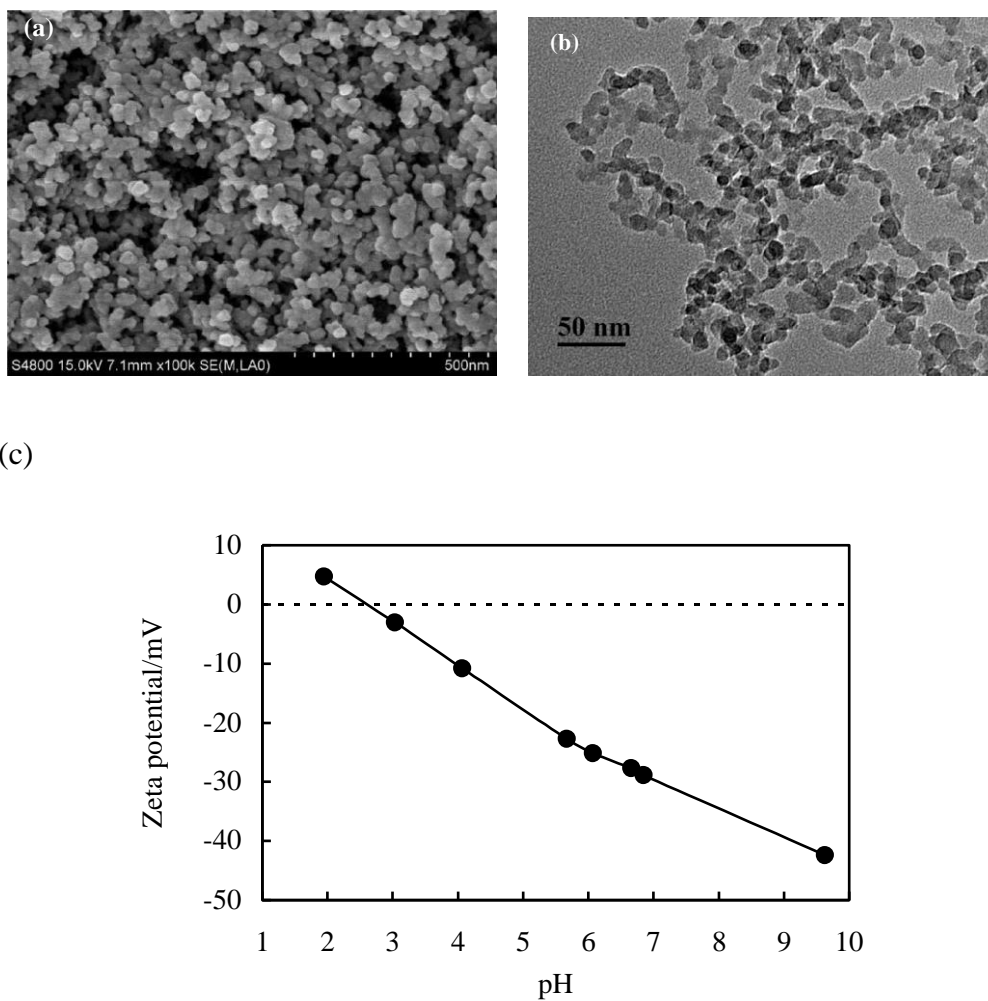
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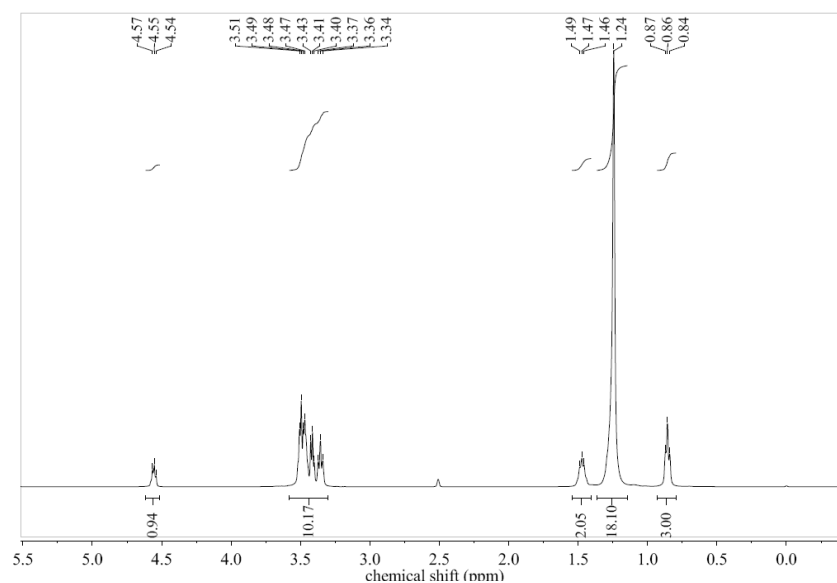
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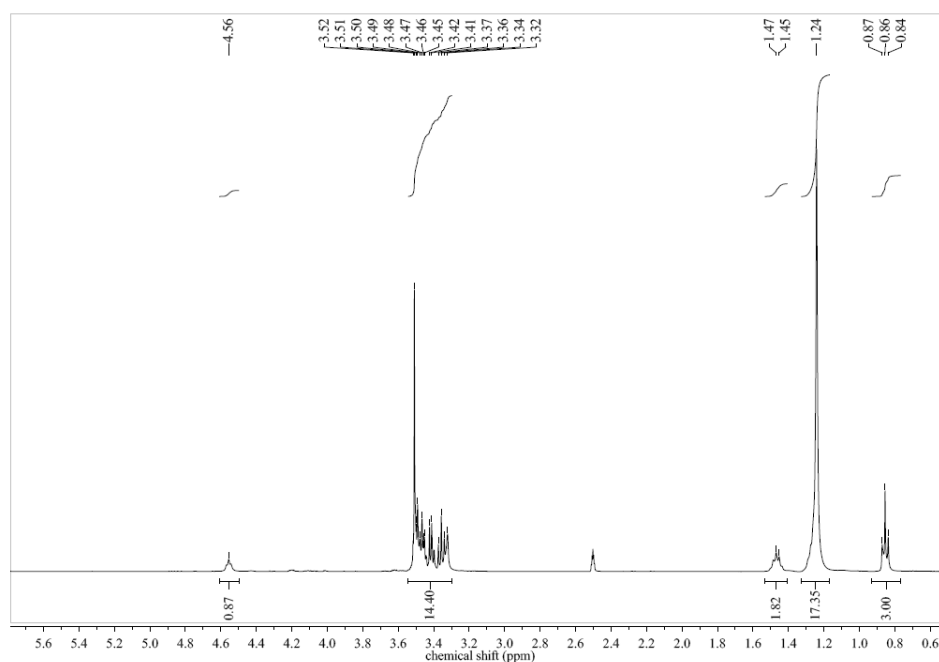
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**Figure S1.** (a) SEM and (b) TEM images of dry silica nanoparticles (HL-200) and (c) Zeta potentials of 0.1 wt.% silica nanoparticles dispersed in water of different pH, measured 24 h after dispersion at 25 °C.

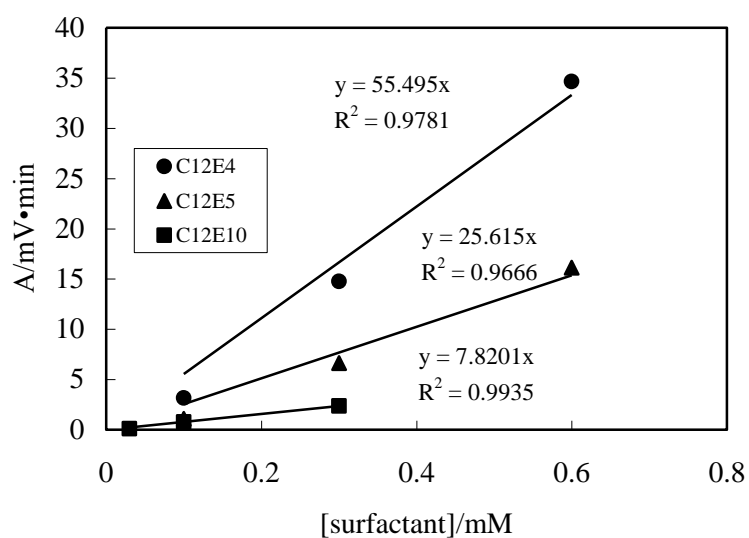


(a)  $C_{12}E_2$ :  $\delta$  4.55(t, -OH, 1H), 3.34~3.51(m,  $-CH_2OCH_2CH_2OCH_2-CH_2-$ , 10H), 1.47(t,  $-CH_2CH_2-CH_2OCH_2-$ , 2H), 1.24 (s,  $CH_3(CH_2)_9CH_2-$ , 18H), 0.86 (t,  $CH_3CH_2-$ , 3H).

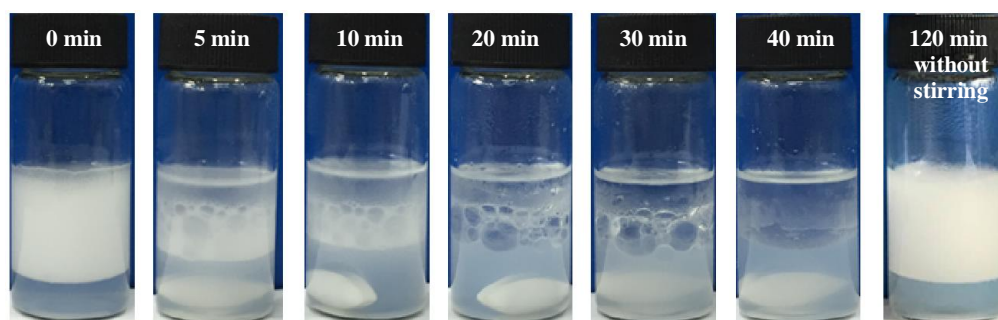


(b)  $C_{12}E_3$ :  $\delta$  4.56 (s, -OH, 1H), 3.32~3.52(m,  $-CH_2OCH_2CH_2OCH_2-CH_2OCH_2CH_2-$ , 14H), 1.47 (t,  $-CH_2CH_2CH_2OCH_2-$ , 2H), 1.24 (s,  $CH_3(CH_2)_9CH_2-$ , 18H), 0.86 (t,  $CH_3CH_2-$ , 3H).

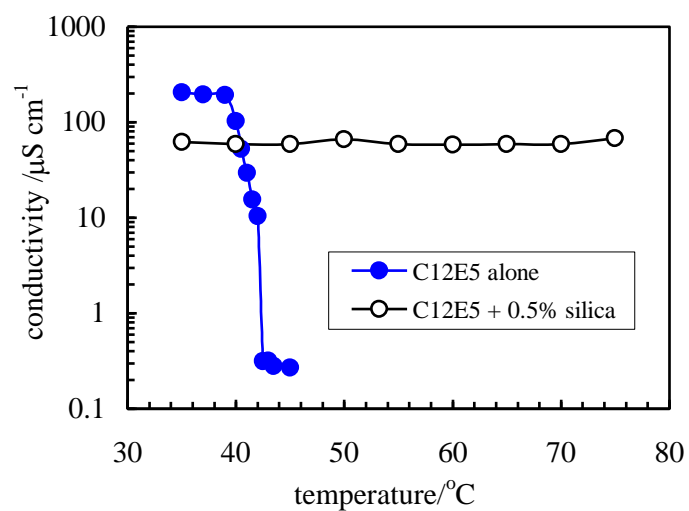
**Figure S2.**  $^1H$ NMR (400 MHz, DMSO) spectra of  $C_{12}E_2$  (a) and  $C_{12}E_3$ (b) synthesized. The chemical shifts of protons and the integration of the peaks correspond well with the molecular structure of synthesized molecules, and no redundant signals are present in the spectra, indicating high purity of the synthesized compounds.



**Figure S3.** Peak area (A) as a function of the concentration of nonionic surfactant in toluene *via* HPLC analysis for a series of standard solutions at 25 °C.



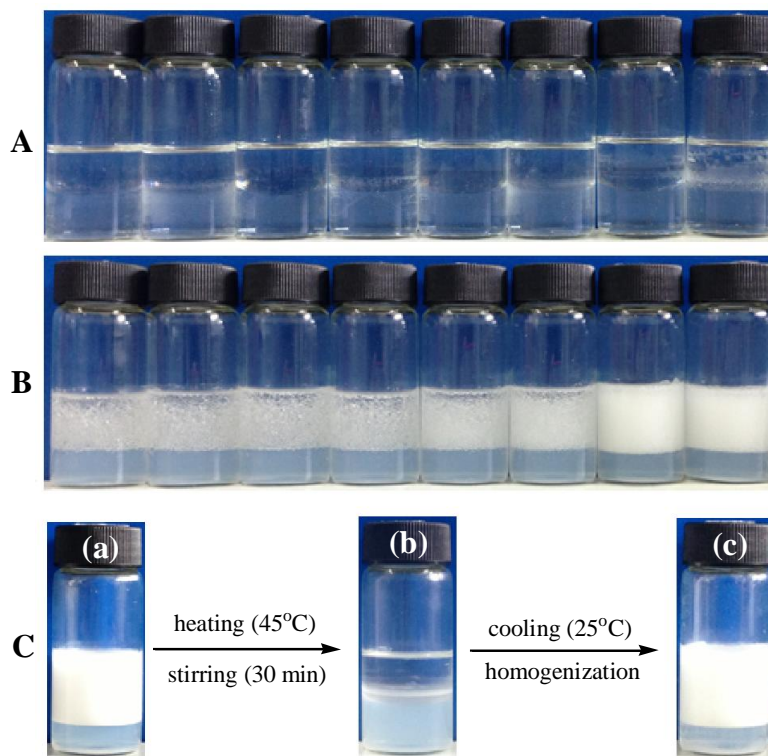
**Figure S4.** Digital photographs of a toluene-in-water emulsion stabilized by 0.5 wt.% silica particles and 0.3 mM C<sub>12</sub>E<sub>5</sub> held at 45 °C for different times with gentle stirring (100 rpm) and for 120 min without stirring.



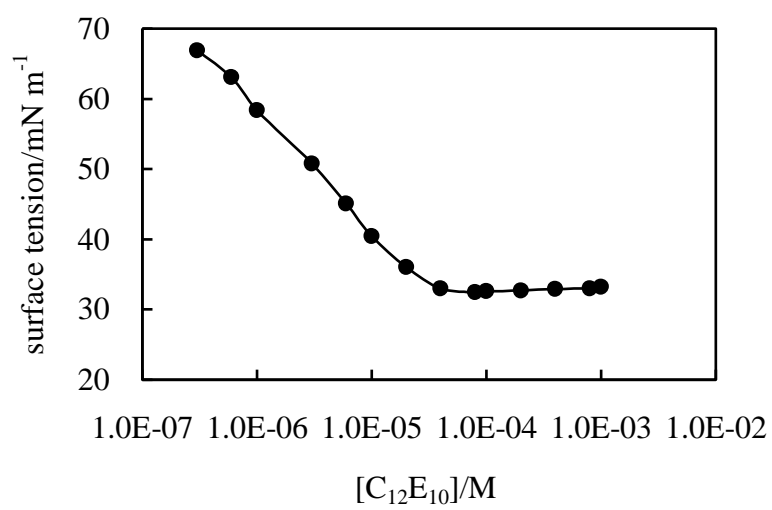
**Figure S5.** Conductivity of dodecane-water emulsions stabilized by 6 mM  $C_{12}E_5$  with and without 0.5 wt.% silica nanoparticles as a function of temperature.



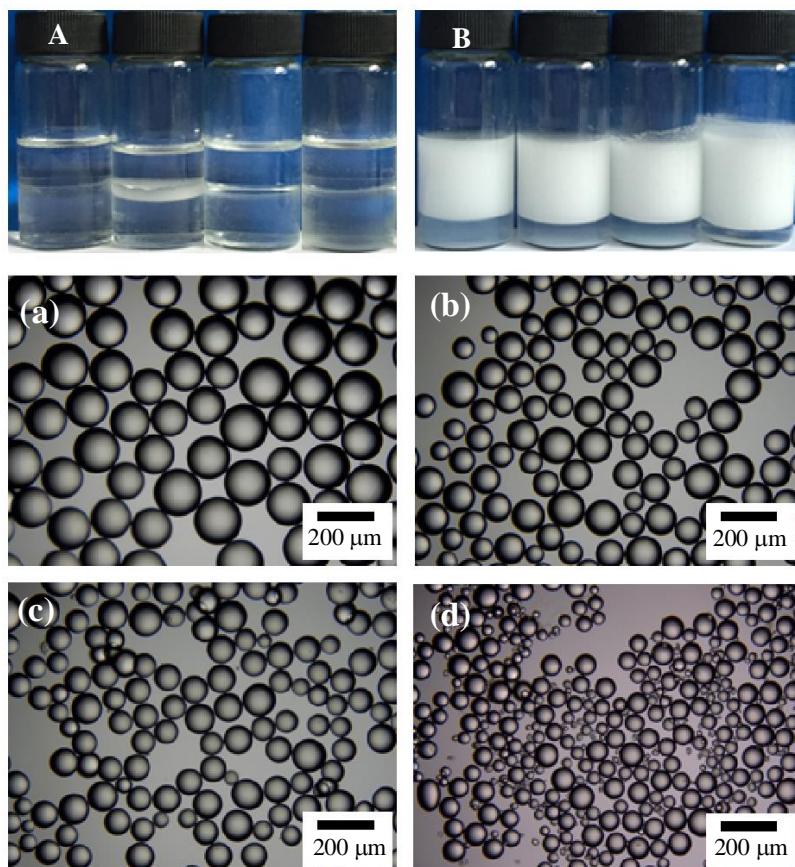
**Figure S6.** Photographs of toluene-in-water (7 mL/7 mL) emulsions stabilized by (A)  $C_{12}E_3$  alone and (B) mixtures of 0.5 wt.% silica nanoparticles and  $C_{12}E_3$  at different concentrations taken 1 week after preparation at room temperature ( $22 \pm 2$  °C).  $[C_{12}E_3]$ /mM in toluene from left to right: 0.1, 0.3, 0.6, 1, 3, 6, 10 and 30.



**Figure S7.** Photographs of toluene-in-water (7 mL/7 mL) emulsions stabilized by (A)  $C_{12}E_2$  alone and (B) mixtures of 0.5 wt.% silica nanoparticles and  $C_{12}E_2$  at different concentrations taken 1 week after preparation at room temperature ( $22 \pm 2$  °C).  $[C_{12}E_2]/mM$  in toluene from left to right: 0.1, 0.3, 0.6, 1, 3, 6, 10 and 30. (C) Photos of thermo-triggered demulsification/emulsification cycling of the emulsion stabilized by 0.5 wt.% silica and 10 mM  $C_{12}E_2$  taken 24 h after operation; (a) initial emulsion at 22 °C, (b) demulsified for the first time at 45 °C, (c) emulsified again at 25 °C.



**Figure S8.** Surface tension of aqueous solutions of C<sub>12</sub>E<sub>10</sub> as a function of concentration at 25 °C.



**Figure S9.** Photographs of toluene-in-water (7 mL/7 mL) emulsions stabilized by (A) C<sub>12</sub>E<sub>5</sub> alone and (B) mixtures of 0.5 wt.% silica nanoparticles and C<sub>12</sub>E<sub>5</sub> at different concentrations and micrographs of the droplets stabilized by the mixtures taken 1 week after preparation at 25 °C. [C<sub>12</sub>E<sub>5</sub>]/mM in water from left to right (A and B) and from (a) to (d): 3, 6, 10 and 30 mM.