

Supplementary Information:

Effect of surfactant tail length and ionic strength on the interfacial properties of nanoparticle-surfactant complexes

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Figure S1 shows the surface tension as a function of time for 10 wt% SiO₂ with 0.1 mM C₁₆TAB in 1 mM NaCl and 10 mM NaCl. After 1000 s adsorption, the suspension in 10 mM NaCl reaches a lower surface tension than the suspension in 1 mM NaCl, indicating more efficient C₁₆TAB adsorption. Upon bulk suspension exchange with deionized water, both systems return to similar surface tensions near the clean air/water value. Figure S2 shows the surface pressure as a function of surface area during the compression and expansion of the rinsed interfaces from Figure S1. The C₁₆TAB/SiO₂ complexes do not adsorb at high enough concentrations in 1 mM NaCl to significantly increase the surface pressure upon compression. Increasing the bulk suspension ionic strength to 10mM helps to screen the electrostatic repulsion between the nanoparticles, increasing adsorption at the air/water interface.

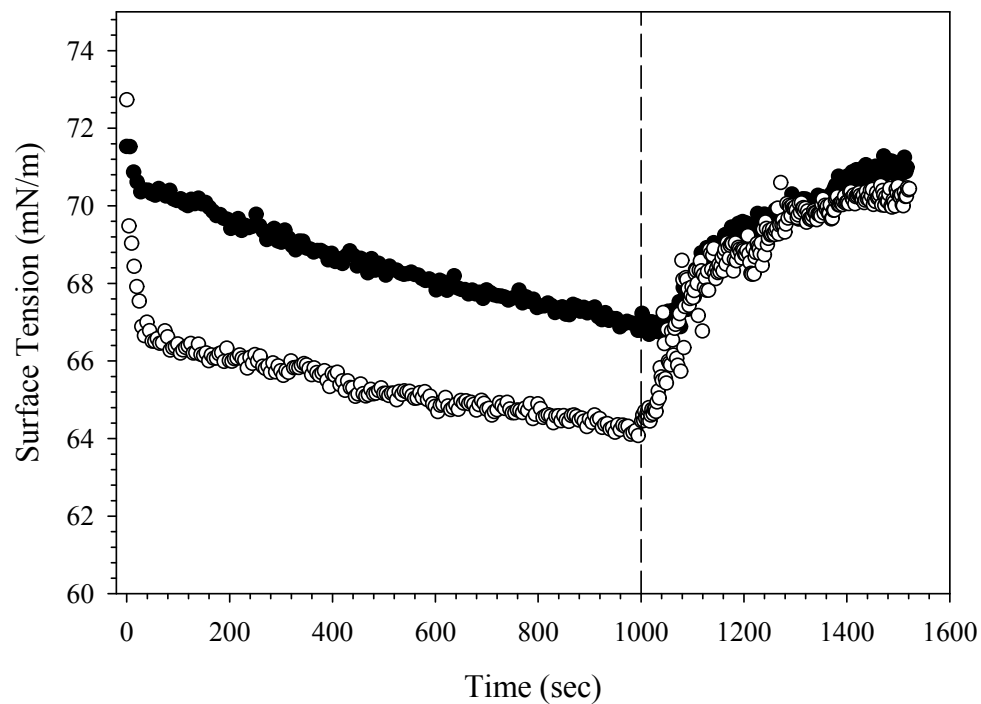


Figure S1: Surface tension as a function of time during the adsorption of 10 wt% SiO₂ with 0.1 mM C₁₆TAB in 1mM NaCl (●) and 10 mM NaCl (○). Bulk dispersion is exchanged with deionized water at 1000s.

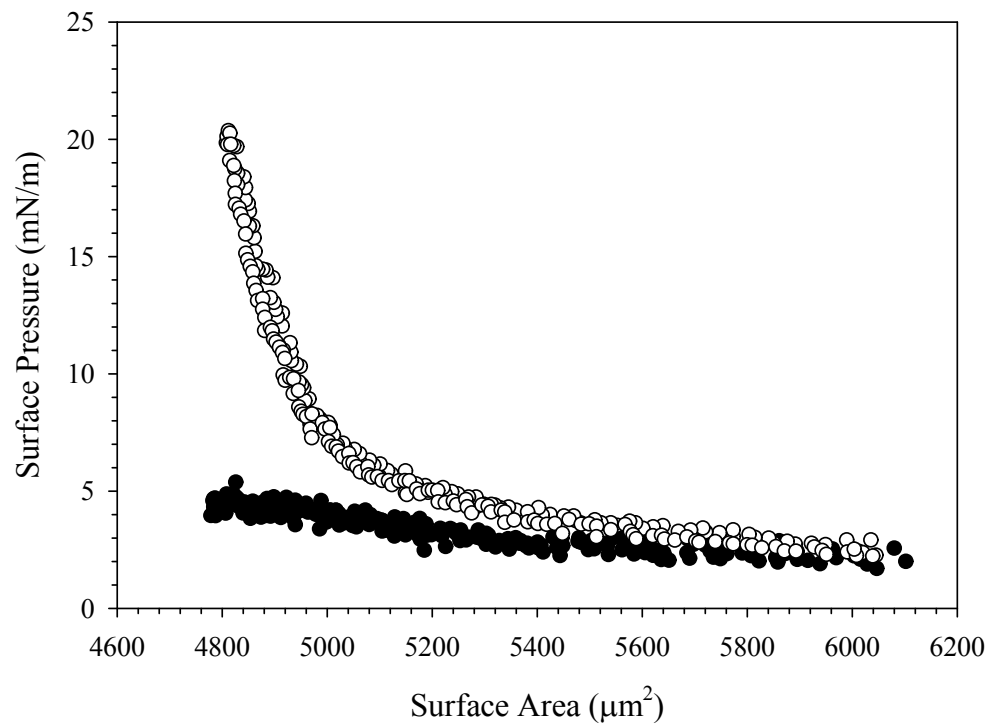


Figure S2: Surface pressure as a function of surface area during the compression of the interfaces from Figure S1 after the rinse with deionized water, at $t = 1500$ s.

During compression experiments of the more rigid interfaces, some attempts to further compress the interface result in a distortion of the spherical cap at the tip of the capillary, as shown in Figure S3. This corresponds to poor fit of the radius to a circle, which assumes a spherical cap geometry. As a result, the surface area is over predicted, altering the shape of the compression curves. When the spherical fit is poor, open symbols are shown in the compression curves (for example in Figure 11).

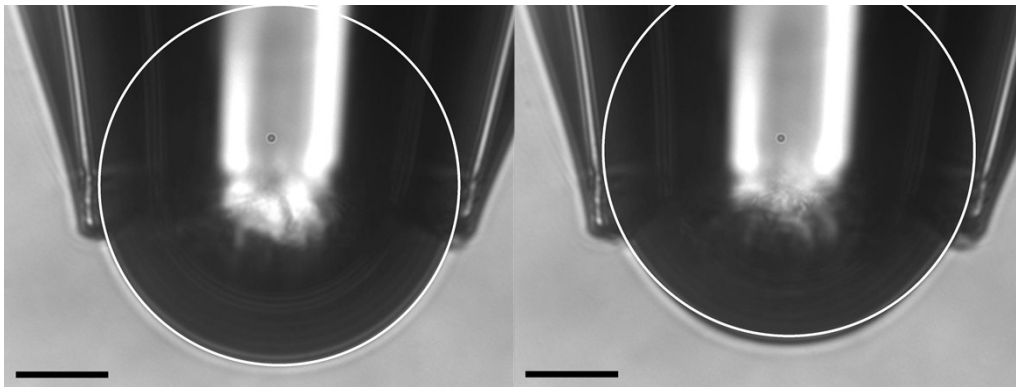


Figure S3: Left: Image of an expanded spherical cap coated with $C_{16}TAB/SiO_2$ complexes in 100 mM NaCl, before compression. White circle represents the radial fit to the interface made in LabVIEW™. Right: Image of the interface during the fourth compression in Figure 11, after rigidification. The interface no longer forms a spherical cap at the tip of the capillary. Scale bars are 20 μm .