Supplementary information

Mixtures of latex particles and surfactant of opposite charge used as interface stabilizers-

Influence of particle contact angle, zeta potential, flocculation and shear energy

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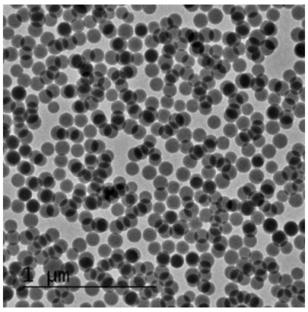
1. **Latex particles from Invitrogen**- TEM image showing their monodispersity. Charge density provided by manufacturer is 1.3 µC/cm^2

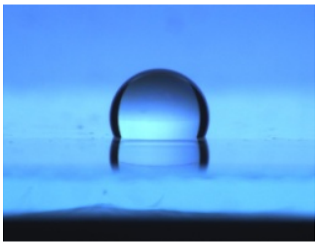


2. Contact angle of the latex particles obtained by spincoating the latex particles

In the core of the paper we present pictures of water droplets deposited on layers of dried suspensions. For the latex particles alone we find a contact angle of the order of 120°.

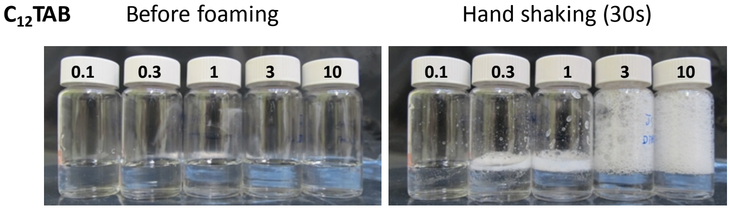
Below we present a picture of a droplet deposited on a latex film which was spin-coated on a silicon wafer and dried. In these conditions, the coating is very homogeneous. The contact angle obtained is of the order of 110°, very similar to the values obtained with the first method.

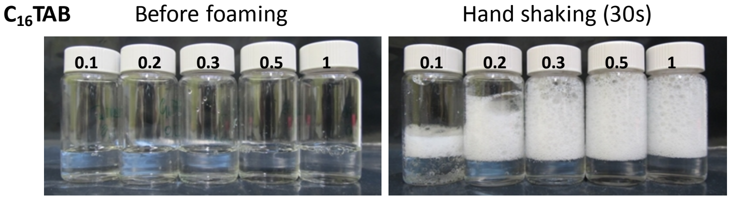
The rugosity of the coating may result in an increase of the apparent value of the contact angle when the substrate is hydrophobic and in a decrease when the substrate is hydrophilic. Therefore here the contact angle may appear larger than the equilibrium contact angle, however, the equilibrium contact angle should necessarily be above 90°.



3. Foams obtained from C_{12}TAB and C_{16}TAB solutions alone by hand-shaking

By hand-shaking the samples for 30 seconds, the surfactant solutions alone enable to produce foams however these foams destabilize over 2 to 3 hours. For the latex/surfactant suspensions, no foam could be produced by hand-shaking, except when there is an excess of surfactant in the solutions : in that case, the foams also destabilize over 2 to 3 hours showing that the foams are stabilized by the surfactant in excess and not by the particles.

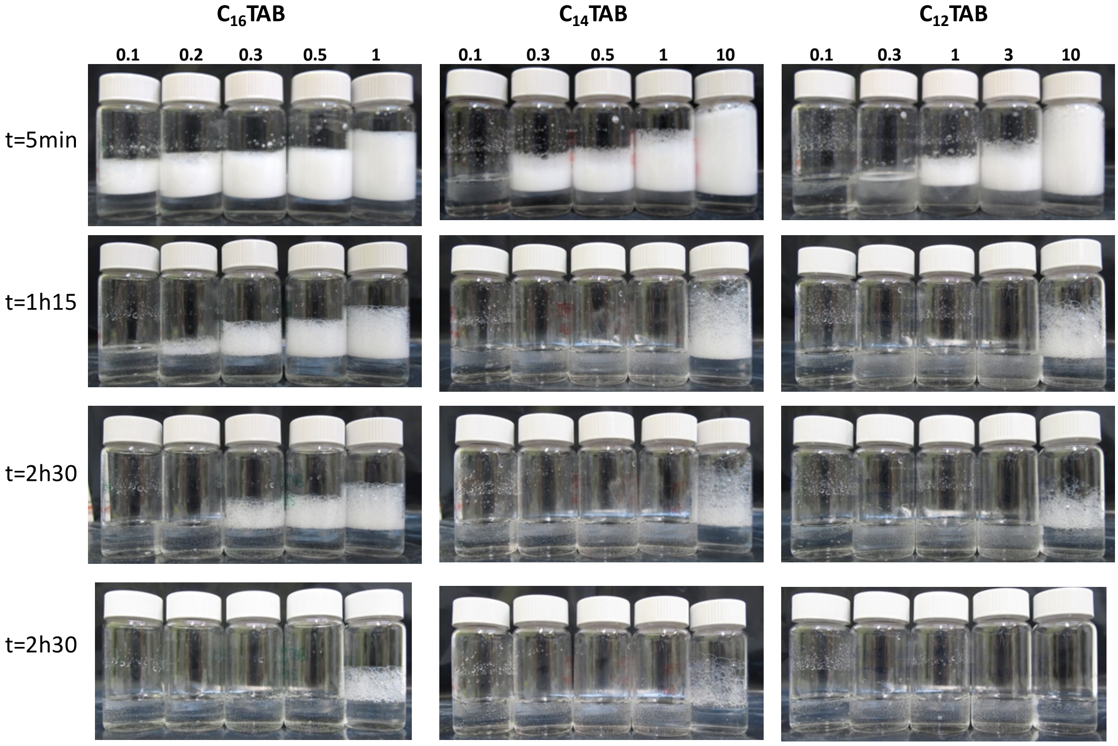




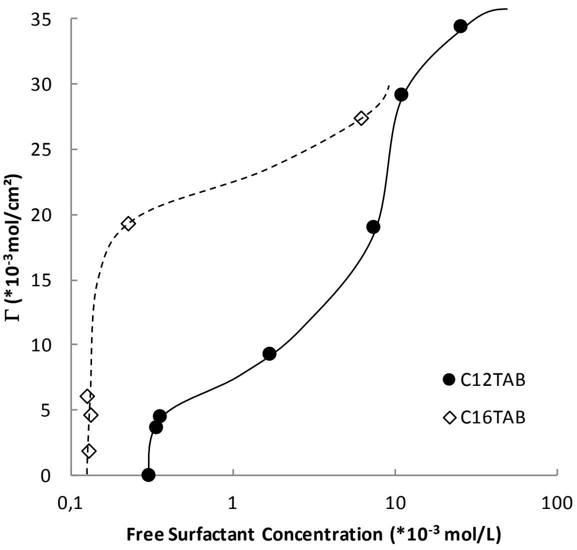
4. Stability of the foams made from C_{12}TAB, C_{14}TAB and C16TAB alone (obtained using ultra-turrax)

The foams containing C_{14}TAB were produced using an ultra-turrax. There are stable for less than 2 hours except the 10mM one.

In the core of the article we show that the foams produced with the latex/surfactant suspensions using an ultra-turrax are stable over 15 days.



5. Relation between concentration of free surfactant and foam stability



The figure represents the adsorption isotherm of the surfactant on the particles as a function of the concentration of free surfactant.

The zone where the surface excess rises steeply and is below 20 mM/cm^2 for C_{16}TAB or below 5 mM/cm^2 for C_{12}TAB corresponds to latex/surfactant suspensions containing a total concentration of surfactant below 3 mM (see Figure 3 in the article), for which, we observe very stable foams. The question we ask here is whether the foam stabilization is induced by the particles (which are laden with the surfactant) or by the surfactants in excess.

It can be seen that in this range of concentrations and surface excess, the amount of free surfactant is very low, around 0.1 mM for C_{16}TAB and 0.4 mM for C_{12}TAB. The foams made from surfactant solutions alone at such very low concentrations, 0.1mM of C16TAB or 0.5 mM of C12TAB are not as stable by more than 2 hours (see Figures in the SI part 3 and 4). This means that the stable foams that we observe for the surfactant/particles mixtures cannot be stabilized by the free surfactant but by the latex particles on which the surfactants are adsorbed.