Modified silica sols based emulsifiers

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Hydrophobically (isobutyl/isopropyl groups) and hydrophilically (poly(ethylene glycol) groups, PEG) modified silica sols have been prepared using a recently developed strategy, resulting in surface active silica sols. The surface activity of the sols has been studied with surface tension measurements at the air-water interface. In comparison, the interfacial activity of non-modified and solely hydrophobically modified silica particles mixed with PEG have been evaluated, showing the important role of the interaction of the PEG chains with the silica particles on the surface activity.

The modified particles have been used for emulsification tests on a model system based on dodecane or toluene as oil, and also in real application such as alkenyl succinic anhydride. A typical dodecane/water emulsion (70wt%/30wt%) is illustrated below.

![Image of oil-in-water emulsion stabilized by modified silica particles.](image)

The surface modified particles appeared to be efficient at low concentration, as low as 0.5 wt% of the oil mass, and giving oil-in-water emulsions. It was also found that the ratio of hydrophile/hydrophobe substituents at the silica particles surface was very important regarding the success of the emulsification and the long-term stability. The amphiphilic character seemed also to play a role for the size of the droplets and for the texture of the resulting dispersions.