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Supplementary Material (ESI) for Soft Matter

Supplementary Information for:

Surface Aggregate Structure of Nonionic Surfactants on Silica Nanoparticles

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1. Characterization of the adsorbed layer by SANS

In the present study the behaviour of the SANS profiles in the high-q region plays an important role in the data analysis based on a model fit to estimate the dimensional parameters and structure of the surfactant aggregates. In order to assess the influence of the subtraction of the incoherent background I_{inc} on the results of the fit at large q obtained either by the core-shell model or the micelle decorated silica model, the incoherent background value has been changed slightly (Figure S1). It was found that this does not leads to any significant improvement in either of the models, as the Porod Law constant A is not significantly affected by the changes in the incoherent background, as can be seen in Figure S1. For the surface concentration Γ_{mx} of $C_{12}E_5$ on silica in contrast matching H_2O/D_2O, the best agreement with the Porod Law is attained by the scattering profile with an incoherent background value I_{inc} = 0.404 nm^{-1}. Such a value is typical for H_2O/D_2O mixtures. When subtracting background values less than 0.404 nm^{-1} the scattering intensity attains a constant value at high q, as in the raw data without background subtraction. When subtracting too high values of the background, the intensity at high q falls off steeply and unphysical (arbitrarily high) apparent power law exponents can be generated over a very limited q range.

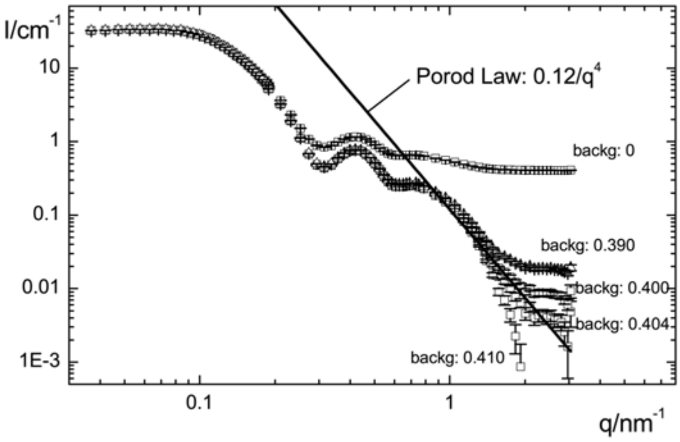

Fig. S1. SANS profiles for the surface concentration Γ_{mx} of $C_{12}E_5$ on silica in contrast-matching H_2O/D_2O after subtraction of different values of the incoherent background I_{inc} as indicated in the graph.

2. Micelle-Decorated Silica Model

The parameters adopted to estimate the radius and the number of the adsorbed spherical surface aggregates on silica are summarized in Table S1. Calculations were made for an assumed layer thickness of 4.0 nm at full surface coverage (Γ_{mx}). The resulting values of the radius and number of surface aggregate per particles are given in Table 5 of the article.

Table S1. Parameters of the micelle-decorated silica model for spherical surface aggregates of $C_{12}E_5$ on silica particles: A, Porod constant, S/V, specific surface area, A_{total}, total surface area of the adsorbed surfactant, R_{sph}, radius of surface aggregates, N_{sph}, number of surface aggregates per silica particle.

surf. concentration	A ($cm^{-1}\cdot nm^{-4}$)	S/V (nm^{-1})	A_{total} (nm^2)
¼ Γ_{mx}	$3.32\cdot10^{-2}$	$6.24\cdot10^{-3}$	$1.69\cdot10^{+3}$
½ Γ_{mx}	$6.23\cdot10^{-2}$	$1.17\cdot10^{-2}$	$3.17\cdot10^{+3}$
¾ Γ_{mx}	$9.73\cdot10^{-2}$	$1.83\cdot10^{-2}$	$4.94\cdot10^{+3}$
Γ_{mx}	$1.20\cdot10^{-1}$	$2.26\cdot10^{-2}$	$6.10\cdot10^{+3}$