Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Theoretical predictions of structures in dispersions containing charged colloidal particles and non-adsorbing polymers

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The resolution function

Here we list some experimental data that are required to establish the resolution function, $R(q,Q)$. Relevant input data are listed below:

- collimation distance: L_4 =1800 cm
- detector distance: $L_5 = 2000$ cm
- detector cell size: $d_{det} = 0.75$ cm
- neutron wavelength: $\lambda = 1.2$ nm

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- wavelength spread: $\delta_\lambda = 0.1$
- source aperture diameter: $s_1 = 3.39$ cm
- source aperture diameter: $s_2 = 0.01$ cm

Defining:

$$l_p \equiv \frac{L_4 L_5}{L_4 + L_5} \tag{1}$$

and

$$\sigma_q(q) \equiv \frac{q^2 \delta_\lambda^2}{6} + \left(\frac{2\pi}{\lambda}\right)^2 \left[\frac{1}{16}\left(\frac{s_1}{L_4}\right)^2 + \left(\frac{s_2}{l_p}\right)^2 + \left(\frac{d_{det}}{2.355 L_5}\right)^2\right] \tag{2}$$

the resolution function is obtained as:

$$R(q,Q) = \frac{1}{\sqrt{2\pi\sigma_q(q)}} e^{\left(-\frac{1}{2}\frac{(Q-q)^2}{\sigma_q(q)}\right)} \tag{3}$$

The smeared structure factors can be seen in Figure 1.

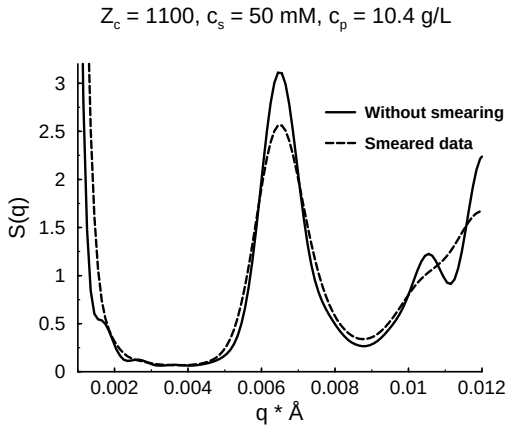

Figure 1: Comparing theoretical predicted smeared data for the structure factor, with c_s =50 mM, and c_p =10.4 g/L, for particle charge, $Z_c = 1100$.

Electrostatic interaction free energies between planar surfaces

For completeness, we here present the electrostatic free energies (g_s) that were used to produce the electrostatic particle-particle potential of mean forces utilized in the main paper.

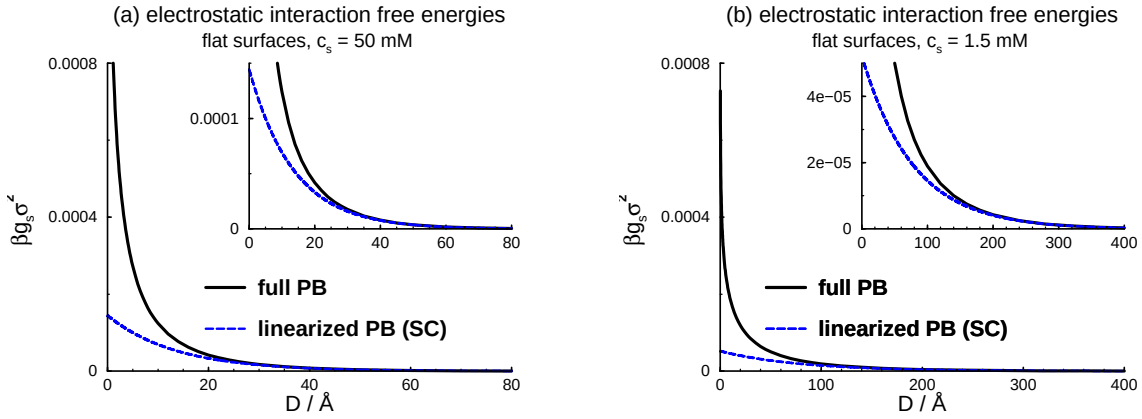

Figure 2: Comparing theoretical predictions of interaction free energies (per unit area) between flat charged surfaces.
(a) $c_s = 50$ mM. Surface charge density: $\sigma_s = 1100e/(4\pi R_c^2)$, where e is the elementary charge.
(b) $c_s = 1.5$ mM. Surface charge density: $\sigma_s = 275e/(4\pi R_c^2)$.