Supporting Information

The influence of long-range surface forces on the contact angle of nanometric droplets and bubbles

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S1. COMPARISON BETWEEN MODEL AND EXPERIMENTS

Here we compare the results of our model with experimental results obtained for nanobubbles and nanodroplets. Note that our model is based only on VdW forces; and attractive hydrophobic, repulsive electrostatic and repulsive hydration interactions are not yet included in the expression of the disjoining pressure. For this reason, the following comparison should be not considered a fit of the experimental results.

In Fig. S1 we compare our results for repulsive VdW forces with experimental data obtained by Kameda et al. for nanobubbles.[1]
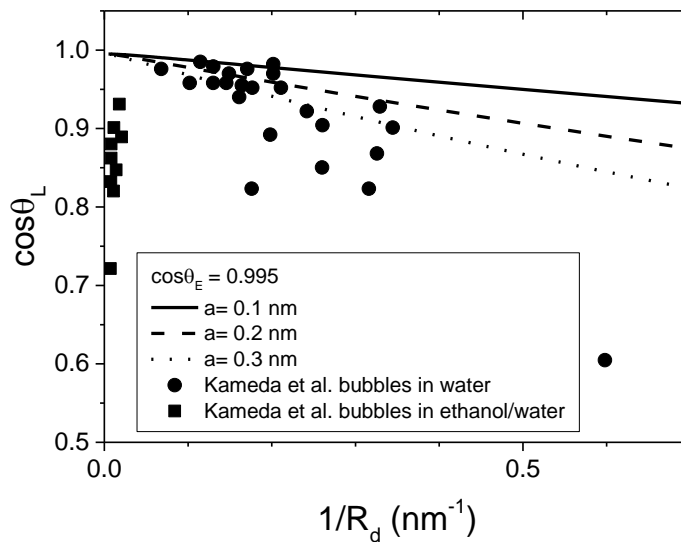

Figure S1. Cosine of local contact angles calculated for repulsive VdW forces with three characteristic lengths a = 0.1, 0.2, 0.3 nm as a function of the inverse of R_d and experimental data on nanobubble contact angle by Kameda et al..[1]

Note that at short distances (large values of $1/R_d$), experimental data follow the same trend of our model for repulsive VdW forces. However, we do not know if the Hamaker constant could be repulsive in the system since it is not easy to calculate the frequency dependent term.[2] An

electrostatic repulsive interaction may be also invoked considering that water interfaces usually possess negative surface potentials.[3] At long distances, the experimental results point to attractive interactions as for the case of nanodrops show in Fig. S2.

In Fig. S2 we compare our calculated results with the experimental results obtained by Berg et al.[4] for fullerene drops on silica substrates. Experimental data could be compared with our model for attractive VdW forces. However, the Hamaker constant corresponding to $\delta_0/b=1.5$ nm is 3×10^{-18} J, which is much larger than typical values for metal interfaces.[5,6] As in the previous comparison, we recall that including other long-range surface interactions in the analysis may lead to Hamaker constants which would agree with literature values. Other effects that may affect the experimental results reported in literature are connected to the contact line pinning over surface defects.
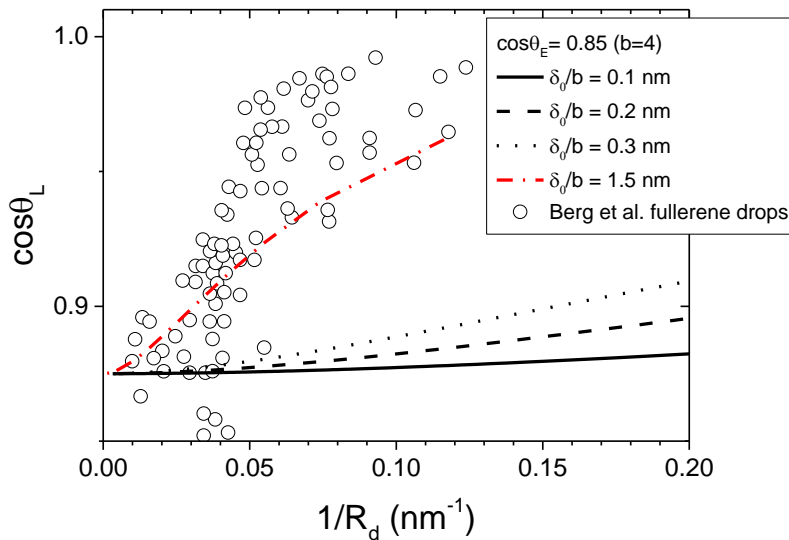

Figure S1. Cosine of local contact angles calculated for attractive VdW forces with four characteristic lengths δ = 0.1, 0.2, 0.3 and 1.5 nm as a function of the inverse of R_d and experimental data on nanodrop contact angle by Berg et al..[4]

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