Wetting of a colloidal particle

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We consider the solvation of big hard-sphere colloids in two types of solvent. In the first case, where the hard-sphere is immersed in a simple fluid exhibiting liquid-gas coexistence, complete wetting by gas (drying) occurs and, in this limit, the colloid-fluid surface tension is non-analytic in R^{-1}, the curvature of the colloidal particle. Moreover the density profile of the solvent near the colloid acquires a contribution proportional to the gas-liquid surface tension $\times R^{-1}$ plus contributions non-analytic in R^{-1}. In the second case, the hard-sphere colloid is immersed in a mixture of (smaller) colloids and polymer that undergoes fluid-fluid phase separation. We treat the mixture in terms of the Asakura-Oosawa-Vrij model and employ a density functional theory to investigate adsorption at the big colloid. As a result of depletion forces, the smaller colloidal particles are preferentially adsorbed and, in the limit $R^{-1} \to 0$, complete wetting by the colloid rich phase can occur . We show that the presence of layering and wetting transitions can have a profound effect on the curvature dependence of interfacial properties and, hence, on the solvation (excess chemical potential) of big colloidal particles.