Supplementary Material (ESI) for *Soft Matter*

Supplementary material

The Length Scales for Stable Gas Nanobubbles at Liquid/Solid Surfaces

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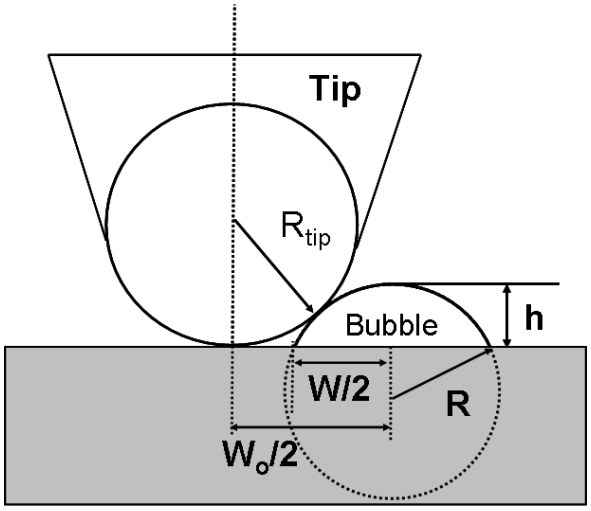
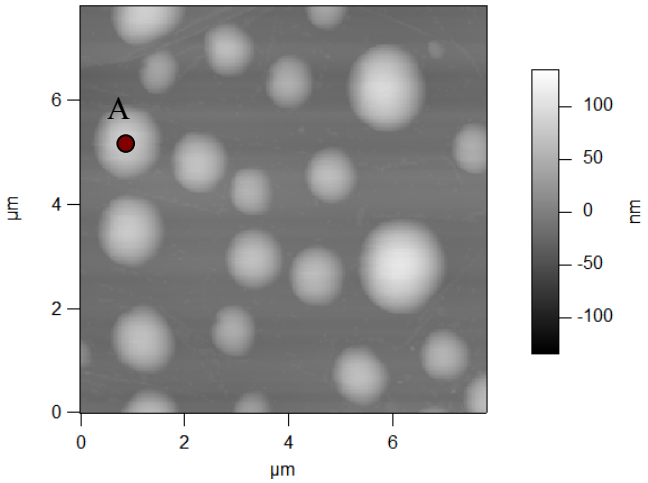
Correction of local curvature. Since the radius of curvature of the atomic force microscopy (AFM) tip (R_{tip} = 20nm) was comparable with those of the bubbles, the AFM images contained a geometric artifact. Under the assumption that the bubble shape is a truncated sphere (i.e., a spherical cap), as shown in supporting Figure 1. The apparent width W_0 is overestimated since the tip contacts with the bubble. W_o can be measured by the height profile of bubble. Real radius of curvature R of bubble and the diameter of base W values can be estimated from R_{tip} and W_o by

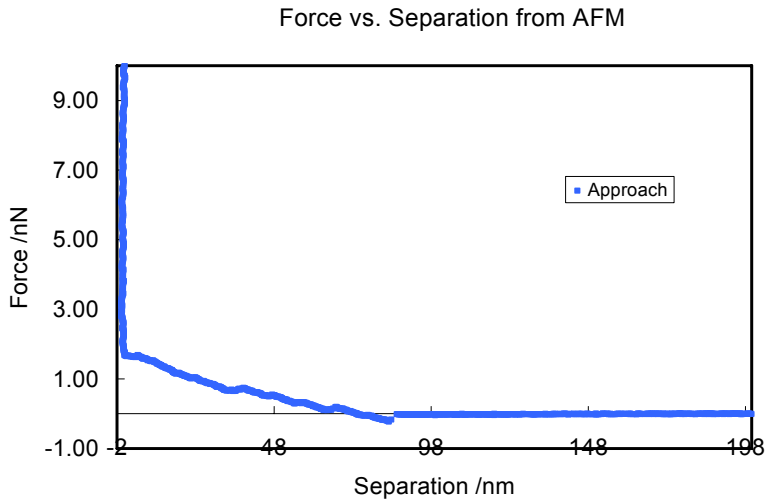
$$R = [(W_o / 2)^2 + h^2] / 2h - R_{tip}$$

$$W = (2Rh - h^2)^{1/2}$$



Supporting FIG. 1 Geometric picture of the AFM tip simultaneously contacting both the substrate (gray part) and bubble. R is the radius of curvature; W is the diameter of base. The base of bubble is defined as its contact area with the solid surface. W_o is the apparent lateral width of height profile of bubble which is obtained by AFM section analysis. R_{tip} is the radius of curvature of AFM tip.





Supporting FIG. 2 The height of the red point on bubble A is 97nm in the tapping mode AFM imaging (A). The force curve collected near the red point shows the height of the bubble is about 85nm (B). So the height of the bubble obtained from these two methods is very similar.