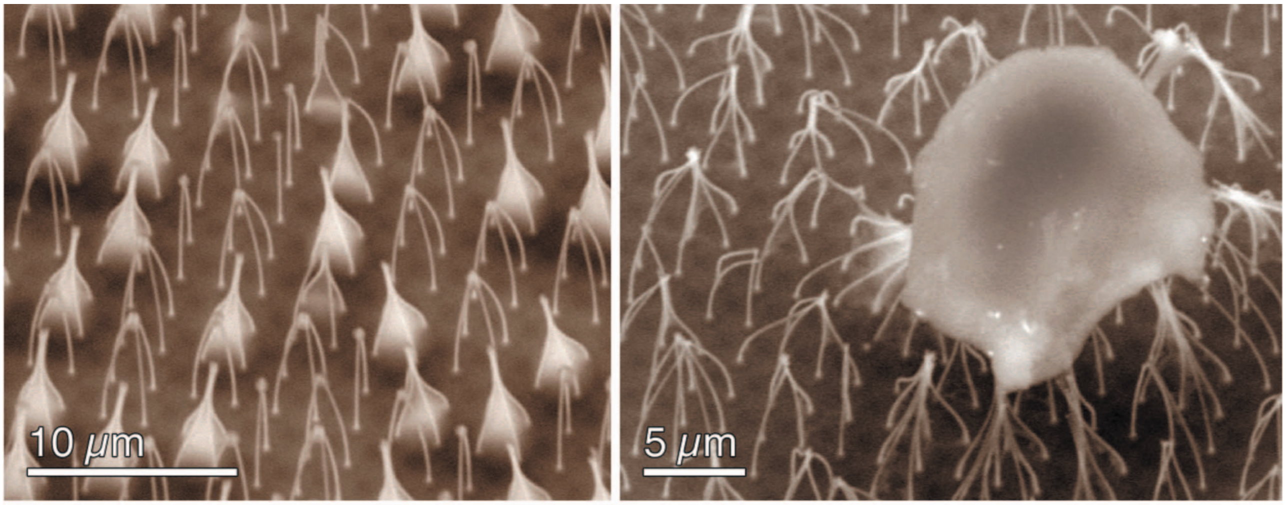

(a) (b)

Figure 1. (a) Entrappped droplets and (b) a pinned droplet on a superhydrophilic surface.

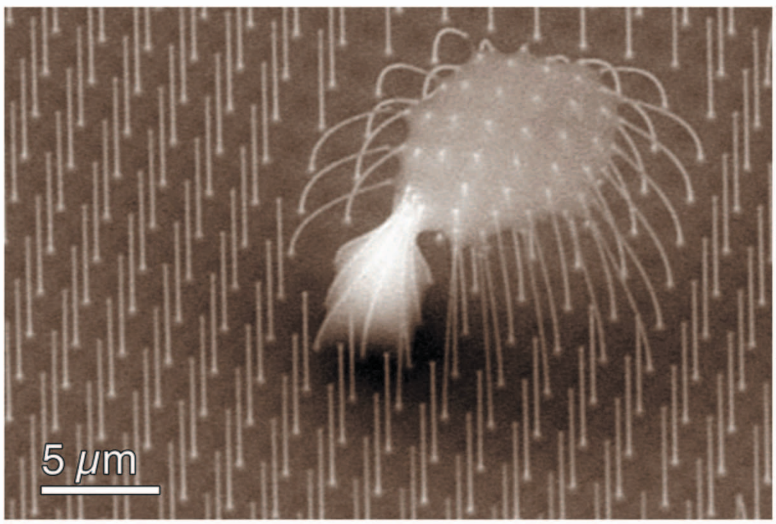

Figure 2. Remains of a mixed mode wetting droplet, Cassie and Wenzel states, on a superhydrophobic surface.

Liquid Evaporation on Superhydrophobic and Superhydrophilic Nanostructured Surfaces

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Environmental scanning electron microscope (ESEM) images of water evaporation from superhydrophilic and superhydrophobic nanostructured surfaces are presented. The nanostructured surfaces consist of an array of equidistant silicon nanopillars with diameter, height, and spacing of 300 nm, 7.5 μm, and 2 μm, respectively. The water vapor pressure in the ESEM chamber was 1400 Pa and the surface temperature was 10 ± 0.1 °C. The three images capture the late stages of evaporation on the nanostructured surfaces. Capillary forces generated by the receding meniscus on the hydrophilic surface result in liquid entrapment and 'kissing' pillars as shown in Figure 1a. These 'kissing' pillars allow for the formation of a rare metastable pinned droplet with a highly irregular contact line as shown in Figure 1b. Figure 2 depicts the remains of a mixed wetting mode droplet, in the Cassie and Wenzel states, on hydrophobic nanostructures comprised of silane-coated silicon. The droplets cause the pillars to bend due to surface tension forces; however 'kissing' pillars are not observed due to the hydrophobicity of the nanostructures. These liquid-surface interactions can significantly alter the dynamics of phase-change phenomena on nanostructured surfaces. The visualizations provide insight into these complex interactions, which is important for integration of nanostructured surfaces in thermal management devices.

