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Effect of pillar height on the wettability of micro-textured surface:**Volume-of-Fluid simulations**

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Abstract:

The wetting and spreading characteristics of a water drop on a surface is highly dependent on the geometric parameters of the micro-texture of the surface. To obtain a stable Cassie drop, the condition that the pillar height must be higher than the sag height of the meniscus is a necessary, yet not a sufficient, condition. From the viewpoint of energy minimization, a new criterion was proposed to design the height of the pillar for achieving a stable and robust anti-adhesive drop state. To ensure such a composite interface, the height of the pillars should be taller than the critical height where the critical contact angle is equal to the intrinsic contact angle. If this height requirement is not met, the drop exists in either a Wenzel or a metastable Cassie state. The numerical simulations using the Volume-of-Fluid method in Fluent support the above proposals.

Keyword: Volume of fluid, superhydrophobic, anti-adhesive, pillar height, simulation

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