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Droplet sliding on inclined superhydrophobic surfaces: the effect of anisotropic contact line. YOUHUA JIANG, LILE CAO, ZONGQI GUO, CHANG-HWAN CHOI, Stevens Inst of Tech — Although the effects of solid structures on droplet retention on superhydrophobic surfaces have been studied extensively, the investigation has been restricted to the sessile droplets on horizontal surfaces where the contact line motions are axisymmetric or isotropic (either advancing or receding). In the droplet retention on inclined surfaces, the contact line motions are asymmetric or anisotropic; the advancing and receding motions coexist. In this study, we investigate the correlation between the droplet boundary pinning and the surface morphology on inclined superhydrophobic surfaces. The evolution of the droplet contact angle and width show contrary behaviors between pillar- and pore-structured surfaces due to the distinctive microscopic contact line motions. Therefore, the visualizations of the contact line motions at different locations of the boundary on inclined superhydrophobic surfaces are performed and the averaged contact line density of the boundary is quantified. The result shows that the droplet retentive force monotonously increase with the increase in contact line density, regardless of the surface morphological types, dimensions, or the direction of contact line motion (advancing, receding, or both). The result indicates that the droplet retentive force on superhydrophobic surfaces is mainly determined by the contact line density, regardless of the isotropy of the contact line.

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