

Abstract Submitted
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Three dimensional force balance of asymmetric droplets¹ YESEUL KIM, SU JIN LIM, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University, KUN CHO, School of Advanced Materials Science and Engineering, Sungkyunkwan University, BYUNG MOOK WEON², School of Advanced Materials Science and Engineering, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University — An equilibrium contact angle of a droplet is determined by a horizontal force balance among vapor, liquid, and solid, which is known as Young's law. Conventional wetting law is valid only for axis-symmetric droplets, whereas real droplets are often asymmetric. Here we show that three-dimensional geometry must be considered for a force balance for asymmetric droplets. By visualizing asymmetric droplets placed on a free-standing membrane in air with X-ray microscopy, we are able to identify that force balances in one side and in other side control pinning behaviors during evaporation of droplets. We find that X-ray microscopy is powerful for realizing the three-dimensional force balance, which would be essential in interpretation and manipulation of wetting, spreading, and drying dynamics for asymmetric droplets.

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