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In Situ Observation of Liquid Capillary Bridges on Superhydrophobic Surfaces ADAM PAXSON, SUSHANT ANAND, KRIPA VARANASI, MIT — We describe a new technique for observing the dynamic behavior of the contact line of a liquid droplet on a superhydrophobic surface using environmental scanning electron microscopy. We find that on a surface patterned with an array of superhydrophobic micropillars, the receding contact line exhibits discrete hierarchical de-pinning events. As the macroscopic contact line recedes across the pillars, capillary bridges are formed along with microscale contact lines, thus perpetuating a self-similar wetting condition. We are able to measure the local receding angle and find that it follows the Gibbs criterion of depinning. By considering the line density of the microscale features and the pinning strength of each of those features, we relate the macroscopic adhesion force to that derived from a model based on pinning of the capillary bridges.

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