

Abstract Submitted
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Drops Bouncing on a Superhydrophobic Surface¹ FRANK VAN SWOL, Sandia National Laboratories — Low solid interfacial energy and fractally rough surface topography confer to Lotus plants superhydrophobic (SH) properties like high contact angles, rolling and bouncing of liquid droplets, and self-cleaning of particle contaminants. By exploiting the porous fractal structure of a novel, synthetic SH surface it is possible to produce a synthetic lotus effect. This is relevant to realizing self-cleaning properties for particle concentration, and the slippery nature of the coating can be used to enhance the performance of fluidic devices. Here we report on molecular dynamics (MD) and some classical density functional theory calculations that provide valuable insight into the conditions needed to cause liquid droplets to form and bounce on a surface. The MD results report on the details of the droplets impacting surfaces of varying wettability, ranging from complete wetting to complete drying. For the SH surfaces we present results for the contact time, between droplet and surface, as a function of impact velocity, droplet size and surface friction.

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