Collective Behavior of Evaporating Droplets on Superhydrophobic Surfaces

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Abstract

We study the evaporation dynamics of multiple water droplets deposited in ordered arrays or randomly distributed (sprayed) on superhydrophobic substrates (SHP) and smooth silicone wafers (SW). The evaluation of mass of the droplets as a function of time shows a power-law behavior with exponent 3/2, and from the prefactor of the power-law an evaporation rate can be determined. We find that the evaporation rate on a SHP surface is slower than a normal surface for both single droplet and collection of droplets. By dividing a large droplet into more smaller ones, the evaporation rate increases and the difference between the evaporation rates on SHP and SW surfaces becomes higher. The evaporation rates depend also on the distance between the droplets and increase with increasing this distance.

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