

Droplet Evaporation on Flexible Nanopillared Surfaces

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Droplet evaporation is not only a fundamental phenomenon in nature, but also very important in biomedical and modern engineering applications. During the evaporation of a sessile droplet, the dynamics of the contact line is also involved. One of the major issues is the mechanism of the pinning and depinning of the contact line (CL), which is essential in understanding the evaporation mode transitions.

In this work, pinning and depinning mechanisms of the contact line during evaporation of the sessile droplets on solid surfaces with both rigid and flexible nanopillars were investigated using molecular dynamics (MD) simulations. Our MD results show that the contact line of the droplet exhibits a stick-slip behavior during the evaporation. We also studied the effect of the nanopillar deformation on the droplet evaporation and proposed an atomic scale understanding of the pinning force of the contact line.

Keywords: Evaporation, Droplet, Contact line, Stick-slip, Molecular dynamics simulation