

Evaporation of a Droplet on a Solid Substrate: from a Puddle to a Small Drop

박진원, 최시영[†]

KAIST

(sqchoi@kaist.ac.kr[†])

Evaporation is a common phenomenon in everyday life. However, most previous studies have been done on the evaporation of a small sessile drop, and a systematic approach to the evaporation rate of a heavy drop is insufficient. The droplet shape is determined by the relative effects of gravity and surface tension. When gravity dominates surface tension, a droplet on a substrate looks like a pancake, called puddle. On the other hand, when surface tension dominates gravity, a droplet on a substrate is shape of spherical cap. The two relative forces are represented by the dimensionless number Bo . Previous studies noted that when a small drop evaporates, diffusion dominates and the evaporation rate is proportional to radius of the drop. On the other hand, for large drop, convection dominates and the evaporation rate is proportional to square of the droplet radius. In this study, drop profile of evaporating water changing from a puddle to a small drop is calculated by Mathematica and compared with real droplet evaporation. Also, how power of radius, which is proportional to the evaporation rate, changes from two to one during evaporation was analyzed.