Droplet evaporation on hot microstructured superhydrophobic surface

Abstract

A thermal circuit model is developed to analysis the heat transfer and evaporation dynamic of the water droplets on hot microstructured superhydrophobic substrates. Spreading and constriction resistances caused by the heat transfer cross-sectional area change are calculated. Temperature distribution from the silicon substrate to the droplet base water layer is calculated. Evaporation process of the water droplet is divided into constant contact radius (CCR) mode and constant contact angle (CCA) mode. Evaporation time of the CCR mode and the CCA mode is calculated based on the thermal circuit model and an evaporation process prediction model is presented. Analytical calculation matches well with the droplet evaporation experimental results. Comparing with the isothermal diffusion-driven model, the thermal circuit model presents a more precise description of the water droplet evaporation dynamic on hot substrate.

Very old version since spreading and constriction resistances are still used