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Wetting and spreading behaviors of impinging microdroplets on textured surfaces[1] DAE HEE KWON, SANG JOON LEE, Center for Biofluid and Biomimic Research, Department of Mechanical Engineering, POSTECH, CENTER FOR BIOFLUID AND BIOMIMIC RESEACH TEAM — Textured surfaces having an array of microscale pillars have been receiving large attention because of their potential uses for robust superhydrophobic and superoleophobic surfaces. In many practical applications, the textured surfaces usually accompany impinging small-scale droplets. To better understand the impinging phenomena on the textured surfaces, the wetting and spreading behaviors of water microdroplets are investigated experimentally. Microdroplets with diameter less than 50 μm are ejected from a piezoelectric printhead with varying Weber number. The final wetting state of an impinging droplet can be estimated by comparing the wetting pressures of the droplet and the capillary pressure of the textured surface. The wetting behaviors obtained experimentally are well agreed with the estimated results. In addition, the transition from bouncing to non-bouncing behaviors in the partially penetrated wetting state is observed. This transition implies the possibility of withdrawal of the penetrated liquid from the inter-pillar space. The maximum spreading factors (ratio of the maximum spreading diameter to the initial diameter) of the impinging droplets have close correlation with the texture area fraction of the surfaces.

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