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Thermocapillary Dewetting of Superhydrophobic Surfaces CRISTIAN CLAVIJO, DANIEL MAYNES, JULIE CROCKETT, Brigham Young University, FLUIDS AND THERMAL TRANSPORT LAB TEAM — One of the challenges in preserving the Cassie-Baxter state during liquid flow over micro-structured superhydrophobic surfaces occurs when the force due to pressure in the liquid exceeds that due to the surface tension above the gas cavities thereby forcing liquid in between the micro-structures. This commonly occurs at the impingement point of a jet or droplet where the stagnation pressure is significant. In this work, we present a novel and simple experimental analysis to show that such a wetting state (i.e. Wenzel state) can be reversed for an impinging liquid droplet through a temperature gradient normal to the solid surface. The temperature gradient acts to alter the surface tension along the structures normal to the surface resulting in possible de-wetting. The experiments consisted of 2 mm water and glycerol droplets held at room temperature impinging on heated micro-post superhydrophobic surfaces. The surface temperature was varied between 50 and 90 °C and the height of the micro-posts between 8 and 18 μm. The results show that hotter surface temperatures and taller posts allow for a nearly complete Cassie to Wenzel transition on the order of 1 ms, thus droplets are able to rebound without sticking to the surface.

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