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Atomization of Impinging Droplets on Superheated Superhydrophobic Surfaces PRESTON EMERSON, JULIE CROCKETT, DANIEL MAYNES, Brigham Young Univ - Provo — Water droplets impinging smooth superheated surfaces may be characterized by dynamic vapor bubbles rising to the surface, popping, and causing a spray of tiny droplets to erupt from the droplet. This spray is called secondary atomization. Here, atomization is quantified experimentally for water droplets impinging superheated superhydrophobic surfaces. Smooth hydrophobic and superhydrophobic surfaces with varying rib and post microstructuring were explored. Each surface was placed on an aluminum heating block, and impingement events were captured with a high speed camera at 3000 fps. For consistency among tests, all events were normalized by the maximum atomization found over a range of temperatures on a smooth hydrophobic surface. An estimate of the level of atomization during an impingement event was created by quantifying the volume of fluid present in the atomization spray. Droplet diameter and Weber number were held constant, and atomization was found for a range of temperatures through the lifetime of the impinging droplet. The Leidenfrost temperature was also determined and defined to be the lowest temperature at which atomization ceases to occur. Both atomization and Leidenfrost temperature increase with decreasing pitch (distance between microstructures).

Preston Emerson
Brigham Young Univ - Provo

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