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Thermal Atomization during Droplet Impingement on Superhydrophobic Substrates[1] PRESTON EMERSON, JULIE CROCKETT, DANIEL MAYNES, BYU — Water droplets impinging superheated substrates may be characterized by dynamic droplet boiling, causing an upward ejection of miniscule secondary droplets, called thermal atomization. In this study, droplets impact superheated, superhydrophobic substrates of varying microstructure configuration for a range of superheat temperatures between 120 and 320 degrees Celsius. Thermal atomization is captured using a high-speed camera and is quantified by estimating the amount of liquid spray present for each impingement event using a 2D image processing technique. The start time, quantity, and velocity of the atomization spray is shown to depend on the microstructure configuration of the substrate (most notably the height and center-to-center spacing of the structures) and the Weber number of the impinging droplet. The droplet boiling regimes are identified for the range substrate temperatures and the Leidenfrost temperature is estimated for each scenario.

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