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An Optical-Based Aggregate Approach to Measuring Condensation Heat Transfer. KIMBERLY A. STEVENS, JULIE CROCKETT, DANIEL R. MAYNES, BRIAN D. IVERSON, Brigham Young Univ - Provo — Condensation heat transfer is significant in a variety of industries including desalination, energy conversion, atmospheric water harvesting, and electronics cooling. Recently, superhydrophobic surfaces have gained attention as a possible condensing surface due to their potential for high droplet mobility and coalescence-induced, out-of-plane jumping of the condensate droplets, both of which contribute to higher rates of condensate removal and thus higher thermal transport rates. Several studies involving condensation on superhydrophobic surfaces have quantified metrics which indirectly indicate the relative rate of heat transfer on a surface, such as maximum droplet diameter, drop size distribution, and individual droplet growth rates. In this study, an optical-based method is used to monitor growth and departure of individual condensate drops for the entire viewing area to obtain full-field, aggregate heat transfer measurements. This approach offers several advantages relative to traditional heat transfer measurement methods such as heat flux sensors and thermocouples, including the ability to provide a link between macroscopic heat transfer rates and the more indirect measures of heat transfer traditionally reported in the literature.

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