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Pool boiling thermal transport through micro-patterned metal superhydrophobic surfaces[1] MATTHEW SEARLE, DANIEL MAYNES, JULIE CROCKETT, Brigham Young University - Provo — Pool boiling thermal transport through horizontal superhydrophobic surfaces decorated with rib and post micro-patterns was explored experimentally. The pool consisted of a water reservoir heated from below by electric heaters embedded in an aluminum block. A test surface was located at the bottom of the pool and fixed to the block. Instrumentation allowed simultaneous measurement of heat flux through the test surface, test surface temperature, and pool water temperature. From these measurements, heat flux as a function of excess temperature (the difference between the test surface temperature and the water saturation temperature) was determined for each surface. Surface geometry was characterized by the cavity fraction (the ratio of projected cavity area to surface area on the test surface), distance between features, and microscale pattern geometry. The transition from nucleate to pool boiling was observed to occur at much lower excess temperatures for superhydrophobic surfaces than for hydrophobic surfaces, with greater deviation for larger cavity fraction. Heat flux versus excess temperature relationships are presented while exploring the influence of superhydrophobic surface microstructure on the thermal transport.

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