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Nanoscale Wicking Structures CONAN ZHANG, CARLOS HIDROVO, University of Texas at Austin — Heat pipes have been used extensively as heat transfer systems due to their low maintenance and lack of moving parts. These characteristics allow the heat transfer system to be compact for increasingly miniature electronic devices. The fluid flow is possible through the pressure gradient induced by the capillary force and is unaided by external power sources. However, since there is no external force driving the flow, the fluid is entirely dependent on the dimensions and capillary characteristics of the wicking structure. Since the convective and latent heat transfer is strongly dictated by mass flow of the fluid, the wicking structure dimensions should be optimized in order to achieve a maximum flow rate. In order to optimize the dimensions of the wicking structure, a fluidic model was developed to simulate fluid flow based on existing capillarity, Bernoulli and Stokes flow equations for a nanoscale posts array. This fluidic analysis was the initial platform on which thermal performance was based. These results were then compared with experimental data to validate and further examine the effects of wicking structure geometry and wetting characteristics.

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