Area-Scalable High-Heat-Flux Dissipation At Low Thermal Resistance Using a Capillary-Fed Two-Layer Evaporator Wick

S. Sudhakar, J.A. Weibel, F. Zhou, E.M. Dede, S.V. Garimella, IJHMT vol. 135, pp. 1346-1356, 2019.

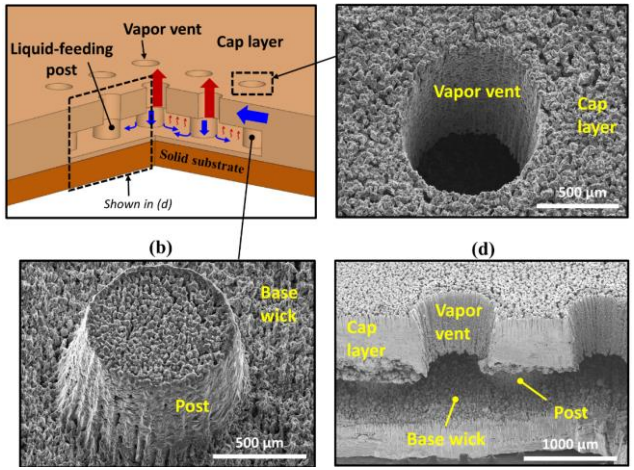
Objective

Various prior wick designs for vapor chambers use horizontal feeding, that limits the maximum heat flux that can be dissipated. The current work uses the distributed liquid feeding of a two-layer wick to demonstrate high fluxes over large areas.

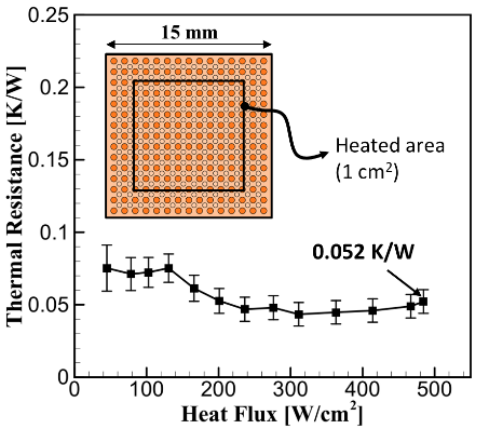
Highlights

- Internal structure of two-layer wick is investigated using SEM imaging and μ-CT scanning.
- Conventional wicks are tested to study the effect of particle sizes on performance.
- A two-layer wick is shown to dissipate ~ 500 W/cm^2 over 1 cm^2 heated area, at a low resistance of 0.052 K/W.
- The thermal performance is compared against the literature to showcase the advantages.

SEM imaging of the two-layer wick



Thermal Test Results



Comparison to Literature