

# The role of vapor venting and liquid feeding on the dryout limit of two-layer evaporator wicks

S. Sudhakar, J.A. Weibel, F. Zhou, E.M. Dede, S.V. Garimella, *IJHMT* 148, p. 119063, 2020.

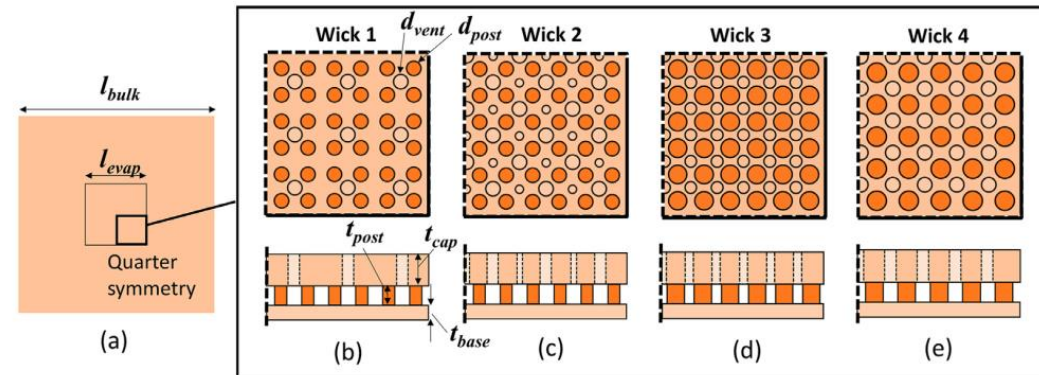
## Objective

A two-layer wick design has been shown to dissipate high heat fluxes over large heater areas ( $1 \text{ cm}^2$ ). The current study characterizes the effect of design parameters (vapor-venting and liquid-feeding areas) on the dryout limit, for optimization of the wick design.

## Highlights

- Various two-layer wick designs, fabricated by sintering and laser machining, are experimentally characterized.
- Increasing the vapor venting area from 7% to 16% shows a significant improvement in the dryout limit ( $315 \text{ W/cm}^2$  to  $405 \text{ W/cm}^2$ ).
- Visualizations reveal that smaller venting areas cause vapor to block liquid supply, and larger areas promote effective vapor venting.
- The optimized design of the wick is shown to dissipate  $>500 \text{ W/cm}^2$  over a  $1 \text{ cm}^2$  heated area.

## Schematic diagrams of the two-layer wick designs



## Capillary-fed boiling curve for the wick designs

