

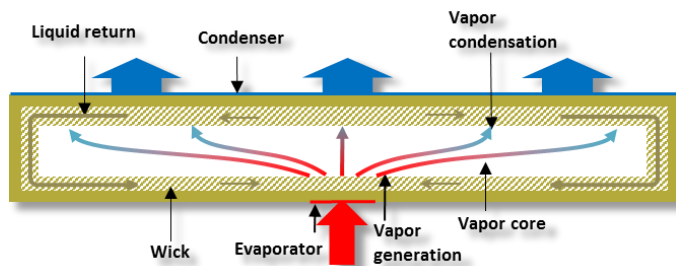
# A Method for Thermal Performance Characterization of Ultra-Thin Vapor Chambers Cooled by Natural Convection

Faculty: S. V. Garimella and J. A. Weibel

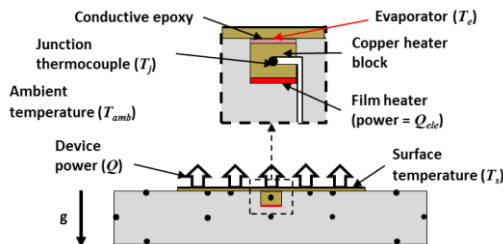
Student: G. Patankar

## Objective:

Develop technique for performance characterization of ultra-thin vapor chambers that must reject heat to the ambient in portable electronic devices



Schematic diagram of vapor chamber operation



Schematic diagram (top) and image (right) of experimental facility

## Experimental Approach & Capabilities

- (1) Precise evaluation of vapor chamber performance at very low power densities ( $<1 \text{ W/cm}^2$ ), cooled by natural convection, which necessitates careful calibration of the parasitic heat losses
- (2) Infrared measurement of the of condenser-side surface temperature distribution for performance assessment

## Conclusions & Impact

- (1) A performance metric characterizing the hotspot mitigation capability of a vapor chamber is required to assess skin temperature distribution and user comfort
- (2) The testing methodology developed is offered as an important tool for characterizing and comparing vapor chambers using a standard approach

## Publication

G. Patankar, S. Mancin, J. A. Weibel, M. A. MacDonald, and S. V. Garimella, "A method for thermal performance characterization of ultra-thin vapor chambers cooled by natural convection," *InterPACK/ICNMM*, San Francisco, CA, July 6-9, 2015 (**Outstanding Paper Award**).