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**Influence of In-Plane Liquid Ordering on Thermal Resistance Boundary Effects at Liquid/Solid Interfaces**[1] HIROKI KAIFU, SANDRA TROIAN, Caltech, 1200 E. California Blvd, MC 128-95, Pasadena, CA 91125 —

Applications ranging from control of small scale avionics to AI computing platforms are becoming ever more reliant on efficient cooling of high power 3D integrated chips prone to hot spots and thermal runaway. Thermal extraction is now the limiting factor in information processing. As a result, convective cooling using fans and gases is being replaced by liquid cooled microfluidic channels which take advantage of the higher heat capacity of liquids. The decrease in channel dimension size also increases the importance of boundary effects. Here we rely on molecular dynamics simulations to examine the magnitude of the thermal jump in quiescent systems known to occur at liquid/solid interfaces. Most previous studies have examined the influence of liquid density stratification near the solid wall, wettability effects and wall symmetry on the magnitude of the thermal jump. Here we explore in-plane ordering of the first liquid layer adjacent to the solid wall by tuning the local temperature, thermal flux and parameters controlling the intermolecular potentials. Our results, some intuitive and some not, yield a surprisingly general correlation for the thermal jump which reflects the collective response of the first liquid layer.

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