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Characterization of Heat Transfer in Superhydrophobic Microchannels under Different Wetting Modes TAE JIN KIM, CARLOS HIDROVO, The University of Texas at Austin — Slip flow in microchannels is known to reduce the wall friction and consequently decreases the pumping power to drive the flow. One method to achieve slip flow is by trapping gas bubbles in the microchannel wall that is highly corrugated. While the use of rough walls to induce friction reduction is attractive, many microfluidic applications involve coupling of heat source in the microchip: the gas pockets may affect the heat transfer from the heaters to the microchannel walls. The purpose of this research is to explore the heat transfer efficiency of microchannels with corrugated surfaces heated from the side walls. The microchannel walls are modified to have an array of micro-trenches arranged transverse to the fluid flow along the axial direction, and a constant water pressure source is used to drive the flow and control the air pocket size. Advective heat transfer is then analyzed between the microchannel inlet and outlet using laser induced thermometry technique. Under identical flow rate conditions, it is expected that 1) the advective efficiency is affected by the degree of wetting of the corrugated walls and that 2) the advective heat transfer is lower for superhydrophobic microchannels with gas pockets trapped in the corrugated walls than those filled with water.

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