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Heating Effects In Very Rough Polymeric Microchannels PHILLIP GLASS, The University of Texas at Austin, ARNAV CHHABRA, RAVITEJ KANAPURAM, University of Texas at Austin, TAE JIN KIM, CARLOS HIDROVO, The University of Texas at Austin — Slip in internal flows is known to reduce friction and thus reduce the required pumping power. One method to achieve slip is by 'roughening' the surface to induce Cassie state. The Cassie state is a phenomenon in which a liquid rests on top of a rough surface with a gas layer formed underneath. Our research goal is to develop a highly rough microfluidic channel and study the heating effects on the air pockets trapped between the roughness elements. We have prepared a PDMS (poly-dimethylsiloxane) microfluidic channel with trenches on the side walls. The channel dimension is 100um x 110um (width x height), and the dimensions of each trench are 30um x 60um x 110um (width x length x height. As the heat flux into the microfluidic channel increases the air trapped on the trenches expanded increasing the volume of the void. In order to prevent the expanding air from invading the liquid flow layer the pressure drop was increased. Therefore by heating the channel the wetting of air pockets can be prevented even under higher pressure drops, thus maintaining the two phase flow and significantly reducing the friction coefficient.

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