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The Influence of Injection Angle on Bubble Formation from a Micro-Pillar[1] FARZAD HOUSHMAND, DAREN ELCOCK, YOAV PELES, Rensselaer Polytechnic Institute — Bubble formation in a microchannel in the presence of a 150 μm diameter micro-pillar was investigated. Nitrogen stream was injected into water flow in a 225 μm deep, 1500 μm wide, and 27.5 mm long horizontal microchannel through 20 μm slits cut on the micropillar located vertically in the centerline of the channel. Bubble formation in different devices with varying slit angles—with respect to liquid flow—of 0°, $\pm 30^\circ$, $\pm 80^\circ$, $\pm 110^\circ$, and 180° were studied for liquid flow rates of 13, 34 and 54 ml/min, and gas flow rates ranging from 0.5 to 7 ml/min. Based on high speed high magnification imaging, three distinct formation modes were observed depending on the slit angle and liquid and gas flow rates: discrete bubbling, attached ligament, and mixed modes. Micro-PIV technique was used to study the liquid flow in vicinity of the pillar to elucidate the phenomena controlling bubble formation.

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