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High-speed μ-PTV study of microbubble generation in microfluidic T-junction RYOJI MIYAZAKI, TOSHIYUKI OGASAWARA, MITSUHISA ICHIYANAGI, SHU TAKAGI, YOICHIRO MATSUMOTO, The University of Tokyo — The bubble generation in a microfluidic T-junction is investigated by high-speed imaging to develop a novel technique for monodispersed microbubble generation. The proposed technique enables generation of 20 $\sim$ 70 μm diameter bubbles at frequency of 1 $\sim$ 10^2 kHz, under the mean liquid velocity at the order of 1 m/s. The generation process is quantitatively analyzed focusing the time change of the gas area and the distance between the receding interface and the channel corner. The μ-PTV (micron-resolution Particle Tracking Velocimetry) is operated to measure the flow field on the bubble generation by seeding 1.0 μm particles with bright-field microscopy. The bubble generation process is highly periodic; therefore, μ-PTV is iteratively conducted in the same phase of the bubble generation. Time-series velocity-vectors at the order of 1 m/s are measured by this high-speed μ-PTV method. The high-speed imaging indicates that the bubble generation consists of two stages; intruding stage and squeezing stage. The terminal gas area is largely determined by the gas area at the beginning of the squeezing stage. According to the obtained flow field, the liquid gradually flows into the side channel with the growth of the gas tip.

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