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Observations of Tipstreaming in a Microfluidic Flow Focusing Device HANS MAYER, SHELLEY ANNA, Department of Mechanical Engineering Carnegie Mellon University, Pittsburgh PA 15213 — We present experiments involving two-phase flows in a flow focusing microfluidic device. In particular we focus on the interaction of fluid motion and surfactant transport during the tipstreaming mode of droplet formation. Drop size, detailed interface shape, and frequency of drop formation are measured as a function of parameters such as surfactant concentration, dispersed and continuous phase flow rates, and device geometry. The capillary number in these experiments varies from $Ca \sim 0.1$ to 1, consistent with literature values for tipstreaming. Tipstreaming is a mode of drop breakup in which daughter droplets, usually orders of magnitude smaller than the parent drops, are ejected from the pointed tips of parent droplets or bubbles. An attractive characteristic of tipstreaming is that droplets produced are not limited by the device feature size. The overall motivation for our work is the controlled formation of highly monodisperse micron or sub-micron droplets and particles for high-value-added applications like drug delivery and pharmaceuticals.

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