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Dynamics of jet breakup induced by perturbation HO CHEUNG SHUM, JINGMEI LI, SZE YI MAK, University of Hong Kong — We study the breakup of jet to form droplets, as induced by controlled perturbation, in a microchannel. Controlled mechanical perturbation is introduced to the tubing through which the jet phase is injected into the device, which is monitored under high-speed optical imaging. We measure the frequency of droplet formation and the sizes of the droplets as the frequency and amplitude of the perturbation is varied. Droplets can be induced to form at the perturbation frequency only above a critical frequency and amplitude. In this manner, the droplet size can be precisely controlled. The amplitude needed to induce breakup decreases as the interfacial tension of the system is lowered. Moreover, by selectively varying the wettability of the inner wall of the channel, double emulsion droplets can be generated in one step by applying large-amplitude perturbation of the jet phase. Our work demonstrates the potential of using controlled perturbation to generate droplets with tunable size and shapes, with implications on new designs of liquid dispensing nozzles.

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