

Abstract Submitted
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Raydrop: universal monodisperse emulsificator JAVIER RIVERO-RODRIGUEZ, ADRIEN DEWANDRE, YOUEN VITRY, BENJAMIN SOBAC, BENOIT SCHEID, Universit Libre de Bruxelles — The production of monodisperse micro-droplets has many applications in pharmaceuticals, biology and medicine. We have developed a microfluidic device based on capillaries and a 3D printed nozzle, instead of the standard flow-focusing configuration fabricated by soft-lithography, hence avoiding wettability treatments. This device works in the dripping regime in which the production of droplets is monodisperse. We have numerically characterised this regime in the quasi-static limit for negligible flow rate of the disperse phase. For small flow rate of the continuous phase, a folding bifurcation predicts the occurrence of drop formation. However, for larger flow rates the folding bifurcation is inhibited and a jetting regime establishes. To the best of our knowledge, it is the first time a sharp transition between the dripping to jetting regime is computed in the context of the quasi-static approximation. Additionally, this transition is smoothed out by non-negligible flow rate of the disperse phase. Numerical simulations very well reproduce the experiments, allowing for the optimisation of the geometry and the determination of the complete phase diagram.

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