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Forced dewetting for robust scalable generation of Double Emulsions drops with thin shells ANTOINE VIAN, ESTHER AMSTAD, Ecole Polytechnique Federale de Lausanne (EPFL) — Double emulsions drops are small drops contained in larger drops. They can be used as picoliter-sized vessels to conduct chemical or biochemical reactions or to conduct high throughput screening assays. Key to a successful application of these drops is a good stability against coalescence and rupture. Previous studies have shown that the mechanical stability of double emulsion drops increases if their shell is reduced below the m scale. Unfortunately, the fabrication of double emulsion drops with such thin shells at high throughputs is still challenging. We present here a new microfluidics device that reduces the thickness of double emulsion shells to values as low as 250 nm at very high throughputs. This is achieved by injecting double emulsion drops with thick shells into a microfluidic channel that is intersected by many shunt channels. These shunt channels remove a large volume fraction of the oil, contained in the shells of double emulsion drops, thereby reducing their shell thickness to values below 250 nm. We demonstrate that the reduction of the shell thickness of double emulsions improves their mechanical stability and lowers their permeability.

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