Continuous Efficient Multistage Extraction.
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Liquid-liquid extraction is a very common workup strategy in pharmaceutical and fine chemicals production due to its high selectivity and large capacity at relatively small energy consumption. In many cases, multiple extraction stages are required to achieve a high degree of separation.

Current industrial approaches have the disadvantages of excessively large footprint, limited flow capacity and, importantly, are difficult to scale-up. Importantly, flow chemistry and continuous manufacturing still rely on batch based separation steps for work-up.

In this work, we present first a new scalable device for continuous separation, the device has small internal volume, can separate emulsions and since it is driven by surface forces, can separate liquids with same density. After discussing the theory of the device, we’ll provide example of use for extraction and continuous chemical processing.

We will then discuss applications of separation device for multistage liquid-liquid extraction. The scalability of the device allows for the quick implementation of a multistage extraction station also at laboratory scale for process developments; its low holdup volume is less than a few mL for each extraction step, making it suitable for lab-scale extraction and valuable/dangerous chemicals. The set-up can be used also for experimentation and optimization of extraction conditions especially for multicomponent or unidentified species where typically simulations are not adequately reliable. After providing background information and theory of operation, we’ll discuss system design and implementation, show benchmarking of our set up with respect to literature test systems, show a complex multicomponent example and discuss scalability.

References