Fluidics without solid walls

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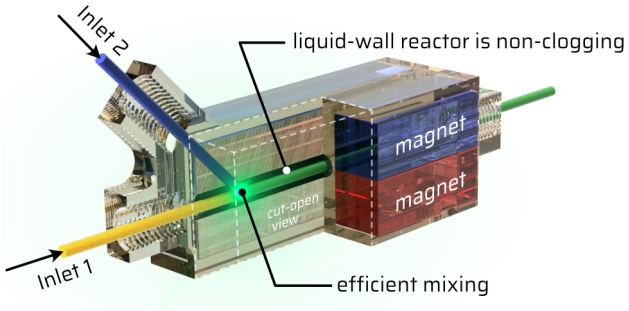
We have recently developed a completely new method to flow and pump fluids in general, using magnetically levitated *"liquid tubes"*.[1] Specifically, quadrupolar magnetic fields cause a magnetic liquid (i.e., a ferrofluid) to surround a second non-magnetic liquid, thus avoiding any solid wall in the entire fluidic device.

Liquid tubes have unique properties, such as 60–90% reduced drag,[2] plug flow,[3] and ultra-soft walls (2–10 kPa)[4]. The liquid walls can easily deform to adapt to the shape of any solid aggregate and evacuate it in a frictionless manner. I show applications in flow chemistry (see figure below, commercialized by our company Qfluidics.com) and in pumping of delicate biological fluids.



References

(1) Dunne, P.; Adachi, T.; Dev, A. A.; Sorrenti, A.; Giacchetti, L.; Bonnin, A.; Bourdon, C.; Mangin, P. H.; Coey, J. M. D.; Doudin, B.; Hermans, T. M. Liquid Flow and Control without Solid Walls. *Nature* **2020**, *581* (7806), 58–62.

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(4) Dev, A. A.; Hermans, T. M.; Doudin, B. Ultra-Soft Liquid-Ferrofluid Interfaces. *Adv. Funct. Mater.* **2024**, 2411811.