SUPPLEMENTARY INFORMATION

Design of hydrodynamically confined microfluidics: controlling flow envelope and pressure

Kevin V. Christ and Kevin T. Turner*
Department of Mechanical Engineering
University of Wisconsin, Madison, WI 53706
*e-mail: kturner@engr.wisc.edu tel: 608.890.0913

This supplementary information document reports results from the computational dynamics fluid (CFD) simulations of device 1 (described in the paper) over a larger range of flow rates than is reported in the paper. The simulation and experimental results reported in the paper focus on output flow rates ranging from 30-90 ml/hr. There are many applications of hydrodynamically confined microflows (HCMs) at lower flow rates. Thus, the experimentally validated CFD model presented has been used to predict pressure drop, envelope width, and average shear stress below the device for flow rates from 0.02 ml/hr to 20 ml/hr (Fig. S1). These values may be useful for design of HCMs at lower operating flow rates.

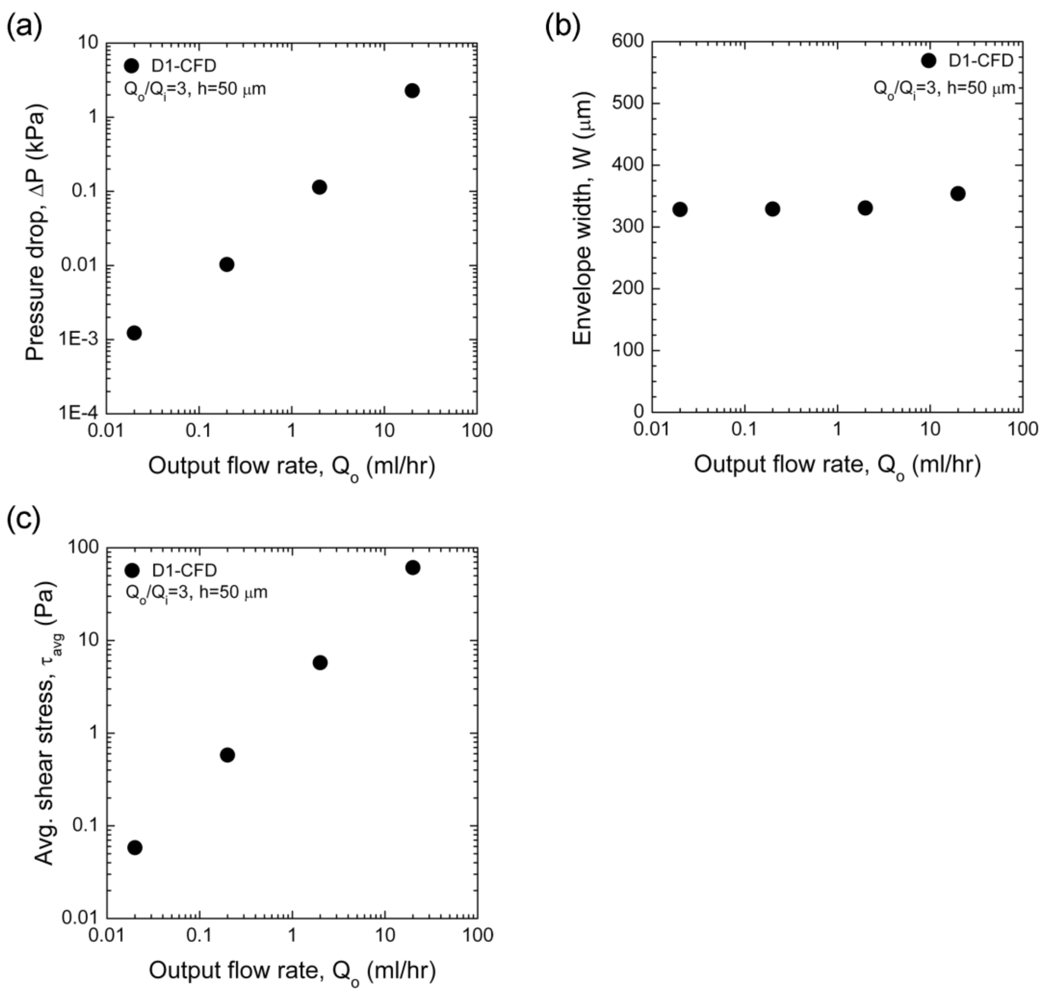

Fig. S1 CFD predicted (a) pressure drop, (b) flow envelope, and (c) average wall shear stress on the surface beneath the device in the region between the ports as a function of output flow rate. Results shown are for device 1 with a gap of 50 μm and $Q_o/Q_i = 3$.

The CFD simulations reported in Fig. 9(a,b) that examine the effect of flow rate ratio were replicated for a smaller inlet flow rate of 0.2 ml/hr for device 1 and are summarized in Fig. S2(a,b). The inlet flow rate was chosen as 0.2 ml/hr as this leads to similar average velocity at the ports as the HCM studies reported in ref. [1].

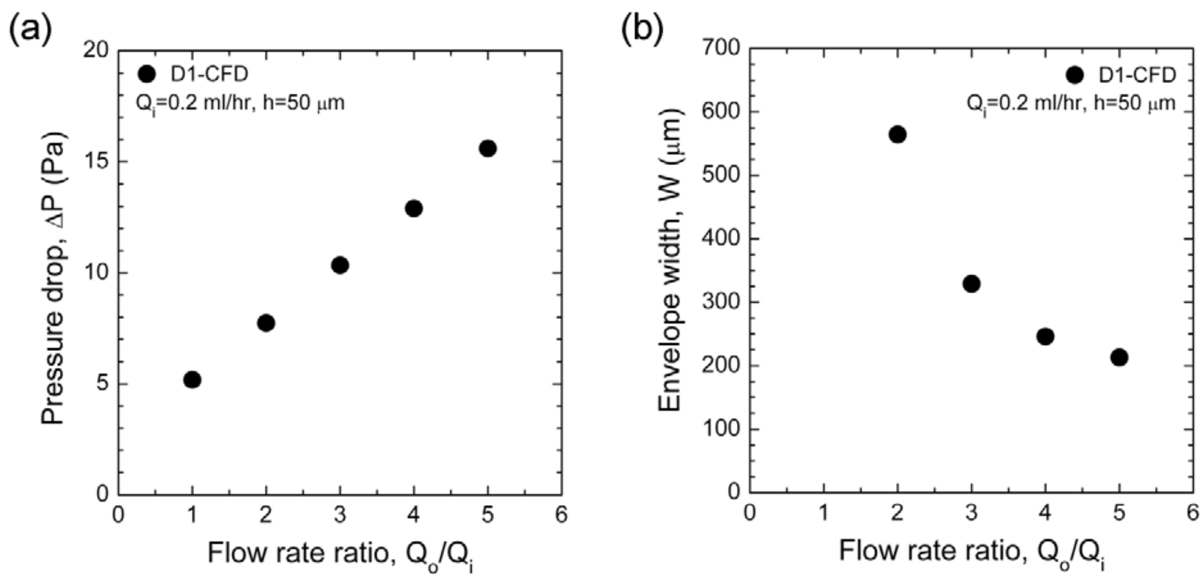

Fig. S2 CFD-determined pressure drop (a) and flow envelope width (b) according to flow rate ratio for device 1 at Q_i = 0.2 ml/hr.

References

1. D. Juncker, H. Schmid and E. Delamarche, *Nature Materials*, 2005, **4**, 622-628.