Electronic Supplementary Material (ESI) for Lab on a Chip.

A Microscale System for In-situ Investigation of Immobilized Microalgal Cell Resistance against Liquid Flow in the Early Inoculation Stage

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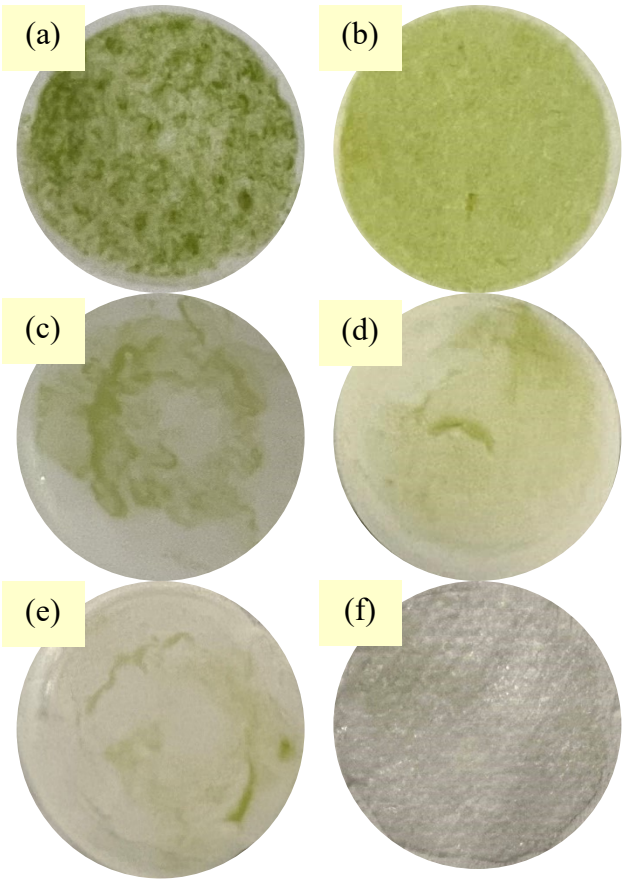

Fig. S1 *C. vulgaris* cells remained on different types of solid supports after gentle rinsing with distilled water: (a) plain printing paper, (b) laboratory filter paper, (c) 0.45 μm cellulose acetate membrane filter, (d) 0.22 μm polyethylene membrane filter, (e) 0.1 μm polyvinylidene fluoride membrane filter, and (f) filter layer of surgical masks. Algal cells had low attachment efficiency on all the membrane filters and mask filter, so the cells were easily drifted out from the solid supports. Plain printing paper was eventually selected as it was extensively used as a main carrier of immobilized microalgae in previous studies [1-4].

Parameters	Unit	Value
Mesh		
Sequence type	-	Physics-controlled mesh
Element size	-	Coarser
Fluid		
Type	-	Fresh BG11 medium
Characteristics	-	Newtonian
Compressibility	-	Incompressible
Turbulence model type	-	None
Density	kg m^{-3}	1,000
Viscosity	Pa · s	0.001
Environment temperature	K	293.15
Fluid inlet velocity	μL min^{-1}	5, 50, 500, and 1,000

Table S2 Key input parameters used in computational fluid dynamics analysis.

References

1. T. Naumann, Z. Çebi, B. Podola and M. Melkonian, Growing microalgae as aquaculture feeds on twin-layers: a novel solid-state photobioreactor, *J. Appl. Phycol.*, 2012, **25**, 1413-1420.
2. L. K. P. Schultze, M.-V. Simon, T. Li, D. Langenbach, B. Podola and M. Melkonian, High light and carbon dioxide optimize surface productivity in a twin-layer biofilm photobioreactor, *Algal Res.*, 2015, **8**, 37-44.
3. R. M. Benstein, Z. Çebi, B. Podola and M. Melkonian, Immobilized growth of the peridinin-producing marine dinoflagellate *Symbiodinium* in a simple biofilm photobioreactor, *Marine Biotechnology*, 2014, **16**, 621-628.
4. H.-D. Tran, T.-T. Do, L. Le, M.-L. Nguyen, C.-H. Pham and M. Melkonian, Cultivation of *Haematococcus pluvialis* for astaxanthin production on angled bench-scale and large-scale biofilm-based photobioreactors, *Vietnam Journal of Science, Technology and Engineering*, 2019, **61**, 61-70.