

Abstract Submitted
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Evaluation of the mass transfer effect of the stalk contraction cycle of *Vorticella* JIAZHONG ZHOU, DAVID ADMIRAAL, SANGJIN RYU, University of Nebraska-Lincoln — *Vorticella* is a protozoan with a contractile stalk that can contract pulling the cell body toward the substrate in less than 10 ms and return to the extended state in a few seconds. Although this stalk contraction is one of the fastest cellular motions, it is unknown why *Vorticella* contracts. Because the flow field induced by *Vorticella* shows different characteristics between contraction and relaxation, it has been suggested that *Vorticella* augments mass transfer near the substrate based on its stalk contraction-relaxation. We investigate this hypothesis using computational fluid dynamics (CFD) simulations and particle image velocimetry (PIV) experiments. In both approaches, *Vorticella* is modelled as a solid sphere that translates perpendicular to a solid surface in liquid based on the measured stalk length changes of *Vorticella*. Based on the computationally and experimentally simulated flow, we evaluate the mass transfer capability of *Vorticella*, for a possible application of the stalk contraction of *Vorticella* as a biomimetic model system for microfluidic mixers.

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