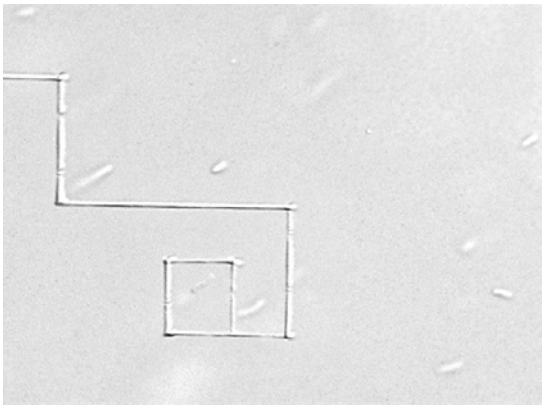
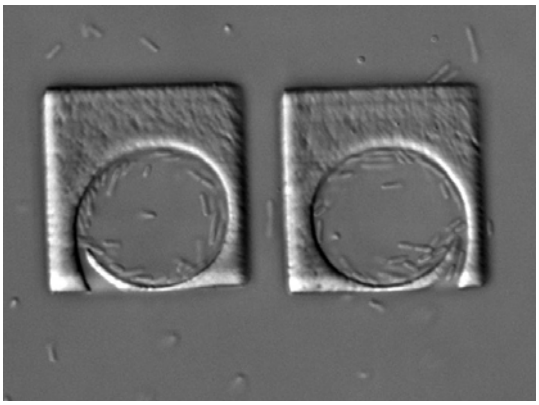
Still images and movie captions for:

Directing bacterial motility using freeform microfabrication

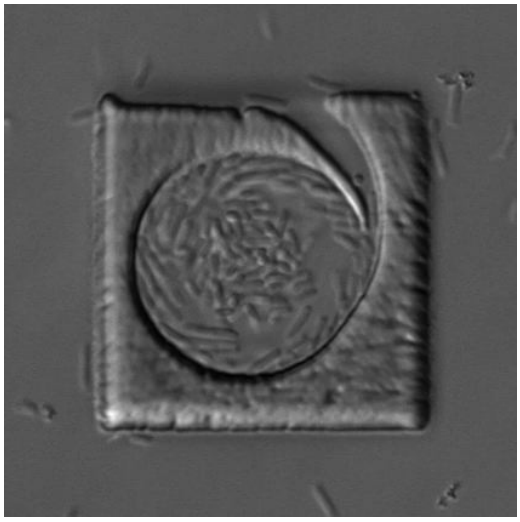
Bryan Kaehr* and Jason B. Shear
Department of Chemistry & Biochemistry and the Institute for Cellular & Molecular Biology, 1 University Station A5300, The University of Texas, Austin, TX 78712



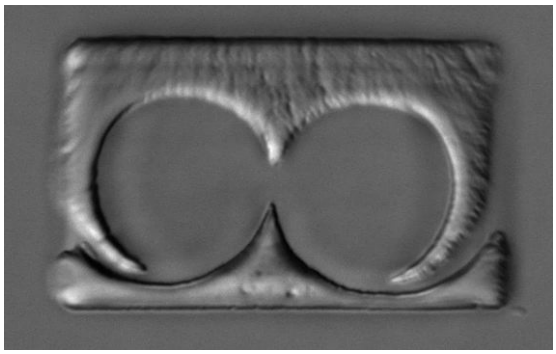
Movie S1. Real-time DIC video (see Fig. 1A) showing re-direction and temporary containment of a single, motile *E. coli* (RP437) by the photofabrication of a surface-adherent protein microstructure.



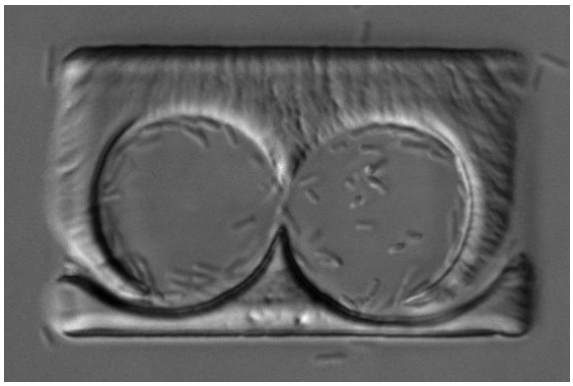
Movie S2. Real-time DIC video (see Fig. 1D, left and middle panels) showing circular microchambers that direct *E. coli* (RP9535) to cycle counterclockwise (left) or clockwise (right) near the chamber perimeter. Bacterial directionality is dictated by the curvature of the wall that a cell encounters on entering the microcontainer.



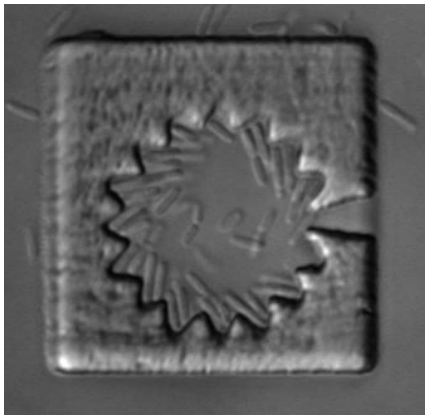
Movie S3. Real-time DIC video (see Fig. 1D, right panel) showing that motile *E. coli* (RP9535) moving clockwise along the perimeter of the microchamber direct the counter-clockwise rotation of non-motile cells in the center of the chamber.



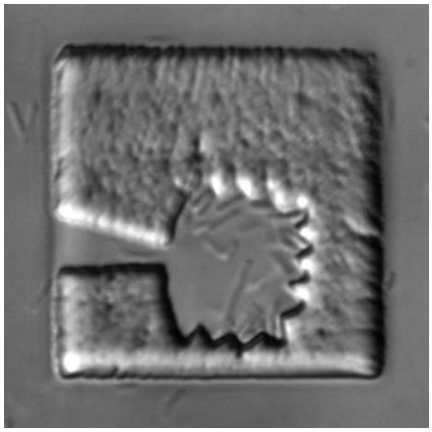
Movie S4. Real-time DIC video (see Fig. 2) showing an *E. coli* cell (RP9535) directed to sweep out a figure-8 pattern within a microchamber.



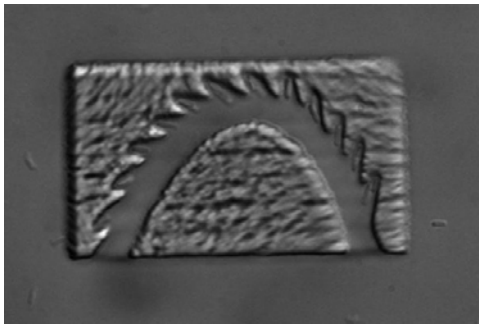
Movie S5. Real-time DIC video showing collisions of motile *E. coli* (RP9535) at the midline of the microchamber in Movie S4 after accumulation of a greater density of motile cells in the chamber.



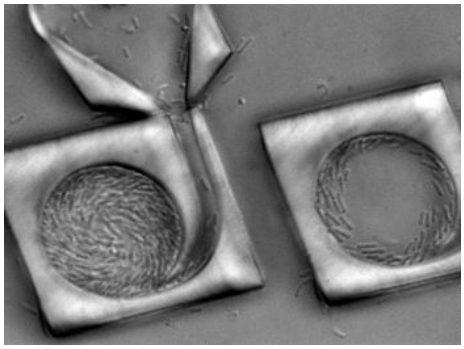
Movie S6. Real-time DIC video (see Fig. 3A) showing a clockwise microvortex created by *E. coli* (RP9535) captured in triangular notches. Beginning at $t \approx 13$ sec, suspended cells achieve clockwise speeds of ~70 μm s^{-1}.



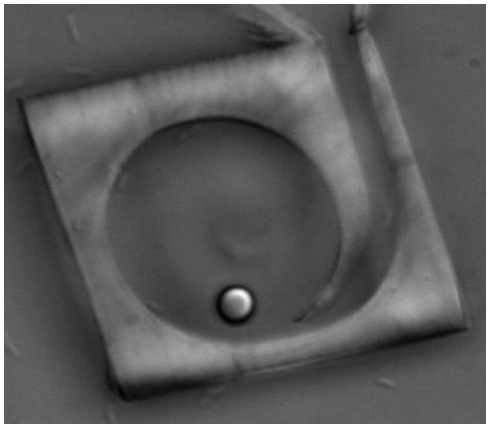
Movie S7. Real-time DIC video showing a counter-clockwise microvortex created by *E. coli* (RP9535) retained in notches. Rotation of a long cell (~6 μm in length) suspended in the center of the chamber provides a clear illustration of the vortex flow.



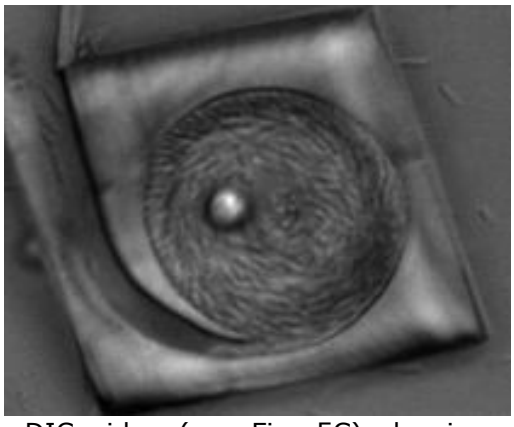
Movie S8. Real-time DIC video (see Fig. 3B) showing axial fluid flow in an arched microchannel produced by the flagellar motion of *E. coli* (RP9535) aligned in canted notches.



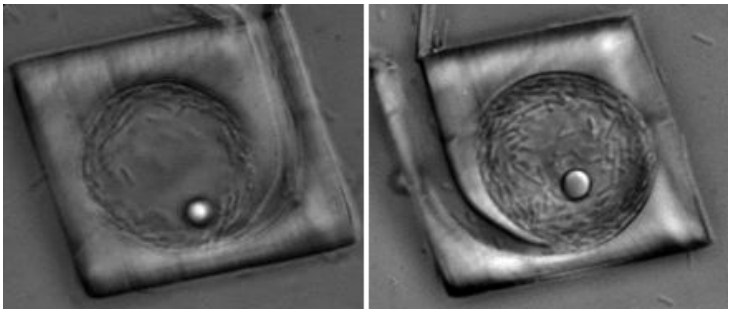
Movie S9. Real-time DIC video of Fig. 4B showing rapid accumulation and motility of smooth-swimming *E. coli* cells in a circular microchamber bridged to the surrounding medium by a rectifying chamber ("hybrid" structure on the left). The chamber on the right is similar to those presented in Figure 1D (Movie S2) that employ a direct entrance (i.e., no rectifier) to the surrounding media.



Movie S10. Real-time DIC video (see Fig. 5A) showing a microsphere trapped inside a circular microchamber starting to accelerate along a counterclockwise trajectory as *E. coli* (RP9535) enter the chamber and swim clockwise along the chamber perimeter.



Movie S11. Real-time DIC video (see Fig. 5C) showing rapid orbital revolution (~3.0 Hz) of a microsphere driven by *E. coli* (RP9535) in a hybrid structure.



Movie S12. Real-time DIC video showing counter-clockwise (left) and clockwise (right) orbital revolution of a microsphere driven by *E. coli* (RP9535) in a hybrid structure (the dimensions of the structure are identical to the structure in Fig 5, Movie S11). The direction of revolution is determined by the orientation of the chamber entrance.