

Supporting Information
Digital Movie Captions

Digital Movie Files: Digital movie file of images taken with LSCM of buffer diffusion into fluorescein-loaded μ gels. The presence of the elevated buffer solution was signaled by an increase in the fluorescein emission, which appears as bright red under the LSCM settings. (The *.avi files are playable with Windows Media Player on a PC, and the *.mov files are provided for viewing with QuickTime on a Mac.)

Control experiment with unmodified μ gel (fig a-d.mov/ fig a-d.avi): Upon the introduction of pH 12 buffer to the unmodified (control) μ gel, buffer diffusion and subsequent μ gel expansion began at the surface and uniformly moved inward until it reached the center. The diameter of the μ gel at the start and end of the movie was 492 μ m and 950 μ m, respectively, and the actual time lapse was 37 min.

Surfactant-induced expansion of modified μ gel (fig e-h.mov/ fig e-h.avi): The surfactant-induced expansion of a fatty acid-modified fluorescein-loaded μ gel proceeded unsymmetrically, beginning in a localized area and propagating around the μ gel's surface until the buffer diffused to the interior. The final region of the μ gel to be exposed to the buffer solution was off center, biased towards the side furthest from initial buffer permeation. The diameter of the modified μ gel at the start and end of the movie was 425 μ m and 958 μ m, respectively. The actual time lapse was 80 min, and the movie begins 45 min after the surfactant solution was flowed into the channel.