FIGURE S1. Pumping flow field around a 2D Brinkman squirmer for increasing ratio of the squirmer parameter b_2/b_1.

Supplementary material

Supplementary video captions

Movie S1: Flowtrace videos under bright-field microscopy corresponding to three vortex patterns in Fig.2, with $a = 61\,\mu m$, $a = 80\,\mu m$, and $a = 102\,\mu m$ (left to right). The vortices around a pinned pumping droplet shift from the posterior to the anterior with increasing droplet diameter. Video clips are played in real time at 40fps and repeated multiple times for ease of viewing.

Movie S2: Flowtrace videos under bright-field microscopy corresponding to three vortex patterns in Fig.2, with $a = 148\,\mu m$, $a = 185\,\mu m$, and $a = 243\,\mu m$ (left to right). The vortices around a pinned pumping droplet are multistable, showing, with increasing size, symmetric quadrupolar, strongly asymmetric dipolar, and, for the largest droplet, asymmetric quadrupolar patterns. Video clips are played in real time at 40fps and repeated multiple times for ease of viewing. Note that in the first panel, the oil droplet contained traces of $1\,\mu m$ diameter colloidal silica particles leading to a serendipitous visualisation of the droplet's internal flow field as well.

Movie S3: Dual-channel videomicroscopy underlying the data in Fig. 6 (the interface of a droplet being gradually saturated by chemical buildup). Black/white frame and green channel track colloidal tracers (Flowtrace), the red channel the fluorescent emission from oil filled micelles with Nile Red marker. The droplet itself is masked in black. Time in experiment displayed in minutes.

Supplementary figure

In Fig. S1, we illustrate the change from dipolar to quadrupolar pumping flows depending on the ratio of b_2/b_1, as predicted by the Brinkman model considering the first two modes. A distinct quadrupolar pattern emerges for $|b_2|/|b_1| > 1$.