

Supplementary information

Videos 1–7. Director-field dynamics and topological defects in activity spots with radii $r = 0.13, 0.15, 0.20, 0.25, 0.40, 1.05,$ and 2.50 . Black lines show the director field, and the background color represents the scalar order parameter. Red dots indicate $+1/2$ defects (arrows show their orientation), and blue dots indicate $-1/2$ defects.

Videos 8–10. Topological defects (red arrowed dots for $+1/2$ defects and cyan dots for $-1/2$ defects) overlaid with viscometric contours $Q = 0$ (white curves) and zero-vorticity contours $\omega = 0$ (blue curves). The background color shows the velocity magnitude and black lines show the director field. Videos show activity spots with radii $r = 0.25, 0.4,$ and 2.5 .