Electric Supporting Information

Circular flow formation triggered by Marangoni convection in nematic liquid crystal films with a free surface

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1. Experimental setup

We used an optical manipulation system consisting of a laser, an inverted microscope, and CCD (Fig. S1). We used a TEM00 continuous wave of an optically pumped semiconductor laser (Coherent, SF 532, 532 nm wavelength), and an inverted microscope (Nikon, Ti-U) attached with a CCD camera (QImaging Micropublisher and Point Grey Research). We inserted a filter cube consisting of Exciter ZET532/10x, emitter ET542lp, and dichroic mirror ZT532rdc-UF1 (Chroma technology) in the inverted microscope to avoid the green light from the laser beam from being incident to CCD.

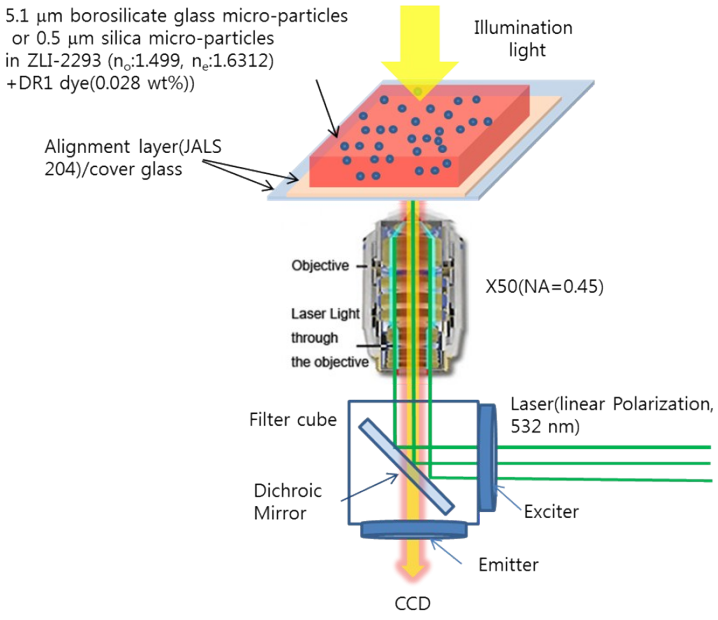

Fig. S1. Experimental setup

2. The evolution from the radial flow to the circular flow.

Conceptual images for the evolution from the radial flow to the circular flow are shown in Fig. S2. Because of the bulge, large bend deformation is established (a). To decrease the energy cost due to this deformation, the director field is deformed (b), and finally a circular flow evolves (c), which results in the director reorientation.

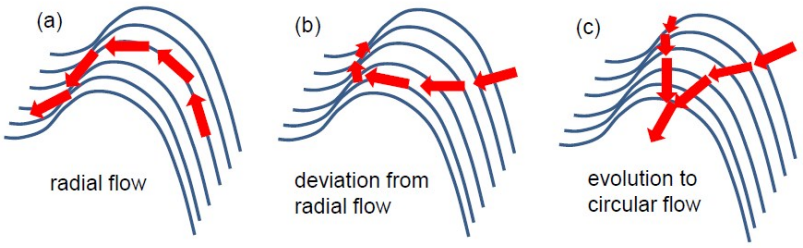

Fig. S2: Conceptual images showing the evolution from the radial flow to the circular flow.

3. Videos showing the dynamics forming three defect structures

Dynamic behaviors of the defect formation are available in the following videos.

Video1(Movies for Fig. 1.wmv): Corresponding to Figure 1 a- and b- series

Video2(Movies for Fig. 3.wmv): Corresponding to Figure 3