Photocontrollable Crystallization at the Topological Defect of a Liquid Crystalline Droplet

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Video information

Movie S1

A movie of photo-induced crystallization in a 5CB droplet in an SDS solution with *p*-nitrophenol during the on-off irradiation of a UV light. The diameter of the droplet was 50 μm. The SDS and *p*-nitrophenol concentrations were 0.3wt% and 0.01wt%, respectively. The UV light was irradiated for 120 s with an intensity of 25mW/cm^2. The movie is played with x8 speed.

File name: MovieS1_5CB_droplet_SDS_p-nitrophenol.mp4

Movie S2

A movie of photo-induced crystallization in a 5CB droplet in an SDS solution with *p*-nitrophenol during the on-off irradiation of a UV light under the crossed-Nicole condition. The diameter of the droplet was 80 μm. The SDS and *p*-nitrophenol concentrations were 0.3wt% and 0.01wt%, respectively. The UV light was irradiated for 30 s with the intensity of 25mW/cm^2. The movie is played with x8 speed.

File name: MovieS2_5CB_droplet_SDS_p-nitrophenol_cross_nicole.mp4

Movie S3(a)

A movie of photo-induced crystallization in a 5CB droplet in an SDS solution with alizarin yellow GG during the on-off irradiation of a UV light. The diameter of the droplet was 55 μm. The SDS and alizarin yellow concentrations were 0.3wt% and 0.01wt%, respectively. The UV light was irradiated for 120 s with an intensity of 25mW/cm^2. The movie is played x16 speed.

File name: MovieS3a_5CB_droplet_SDS_alizarin yellow.mp4

Movie S3(b)

A movie of photo-induced crystallization in a 5CB droplet in an SDS solution with chrome yellow during the on-off irradiation of a UV light. The diameter of the droplet was 50 μm. The SDS and chrome yellow concentrations were 0.3wt% and 0.01wt%, respectively. The UV light was irradiated for 120 s with an intensity of 25mW/cm^2. The movie is played x16 speed.

File name: MovieS3b_5CB_droplet_SDS_chrome yellow.mp4

Movie S4

A movie of photo-induced crystallization in a 5CB droplet in a PVA solution with *p*-nitrophenol during the on-off irradiation of a UV light. The diameter of the droplet was 70 μm. The PVA and *p*-nitrophenol concentrations were 1wt% and 0.01wt%, respectively. The UV light was irradiated for 120 s with an intensity of 25mW/cm^2. The movie is played x8 speed.

File name: MovieS4_5CB_droplet_PVA_p-nitrophenol.mp4

Movie S5

A movie of photo-induced change of a toluene droplet in an SDS solution with *p*-nitrophenol during the on-off irradiation of a UV light. The diameter of the droplet was 70 μm. The SDS and *p*-nitrophenol concentrations were 0.3wt% and 0.01wt%, respectively. The UV light was irradiated for 30 s with an intensity of 25mW/cm^2. The movie played x4 speed.

File name: MovieS5_toluene_droplet_SDS_*p*-nitorphenol.mp4

Movie S6

A movie of the temperature-induced change of a 5CB droplet in an SDS solution with *p*-nitrophenol by a temperature rise. The diameter of the droplet was 60 μm. The SDS and *p*-nitrophenol concentrations were 0.3wt% and 0.01wt%, respectively. The movie was played x16 speed.

File name: MovieS6_5CB_droplet_SDS_p-nitrophenol_heater.mp4

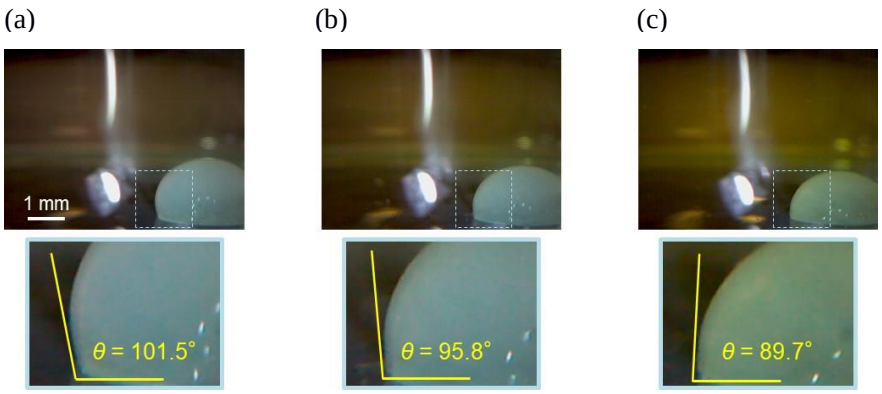

Fig.S1 The dependence of the contact angle of the 5CB droplets in SDS solutions with different dye concentrations; (a) pure SDS solution (b) SDS solution with 0.1wt% *p*-nitrophenol (c) SDS solution with 0.1wt% *p*-nitrophenol. The contact angles are shown at the bottom expanded pictures.

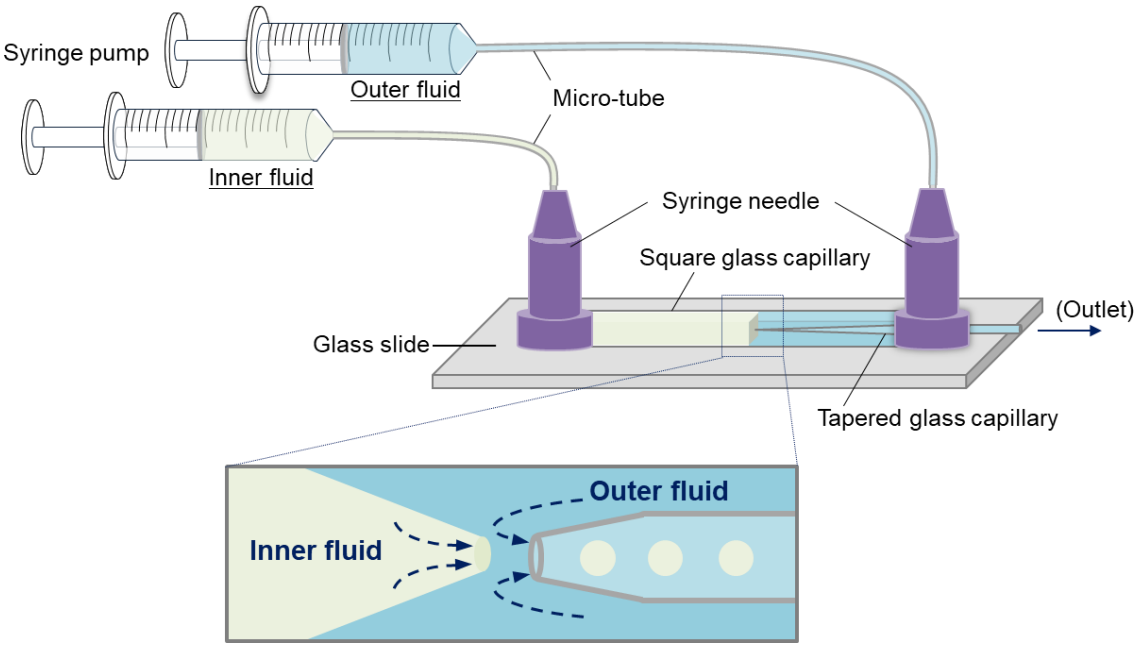

Fig.S2 The schematic of the microfluidic device consisted of a glass capillary, and the geometry of micro-capillaries and the formation mechanism of a single emulsion is shown. A square glass capillary (inner diameter: 0.90 × 0.90 mm) adhered to a glass slide, and a cylindrical glass capillary (inner diameter: 0.70 mm, outer diameter: 0.87 mm) whose tip diameter is 50 μm was inserted into it. The tapered tip was prepared by a micropipette puller (P-1000, Sutter Instruments). Two syringe needles were attached to both the square glass capillary edges, and two syringe pumps and syringe needles were connected via a silicone tube. The syringe pumps introduced the two types of liquids (inner and outer fluids). The inner fluid was introduced from the left side of the square glass capillary to the outlet side, and the inner fluid was sheared by the outer fluid introduced from another side of the square glass capillary. The LC droplets were formed and flown in the inlet of the tapered cylindrical capillary.

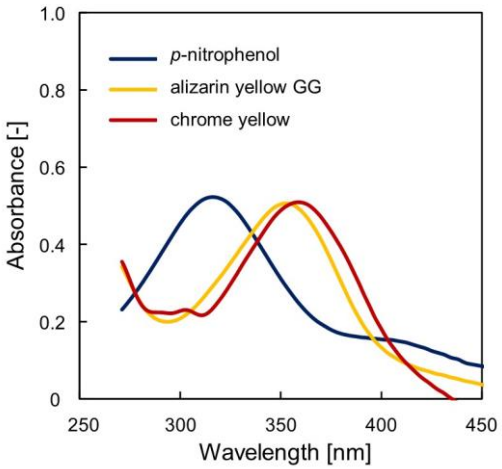

Fig.S3 UV/Vis absorption spectra for *p*-nitrophenol, alizarin yellow GG, and chrome yellow are shown. These chemicals were solved in water with concentrations 2.80×10^{-5}, 3.56×10^{-5}, and 2.40×10^{-5} mol/L, respectively.

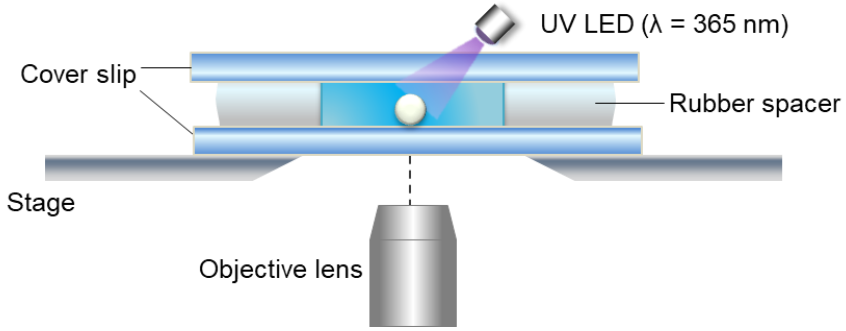

Fig.S4 A schematic drawing of the observation setup is shown. A rubber spacer (thickness: 0.2 mm) with an open space was sandwiched by two coverslips (thickness: 0.12-0.17 mm), and a surfactant solution including LC droplets was pipetted into the open space. The cell was placed on an inverted optical microscope (IX71, OLYMPUS) under bright-field or polarized observation. The LC droplet was illuminated by a UV light with an oblique angle of 40 degrees from the vertical direction. A non-polarized UV-LED (Execure LH-1V, HOYA, Center wavelength: 365 nm) was used as a UV light source with an intensity of 25 mW/cm^2 unless otherwise stated. The reflected image was observed with a CCD camera (DCU223C, Thorlabs).