Supporting Information

Cholesteric liquid crystal droplets for biosensors

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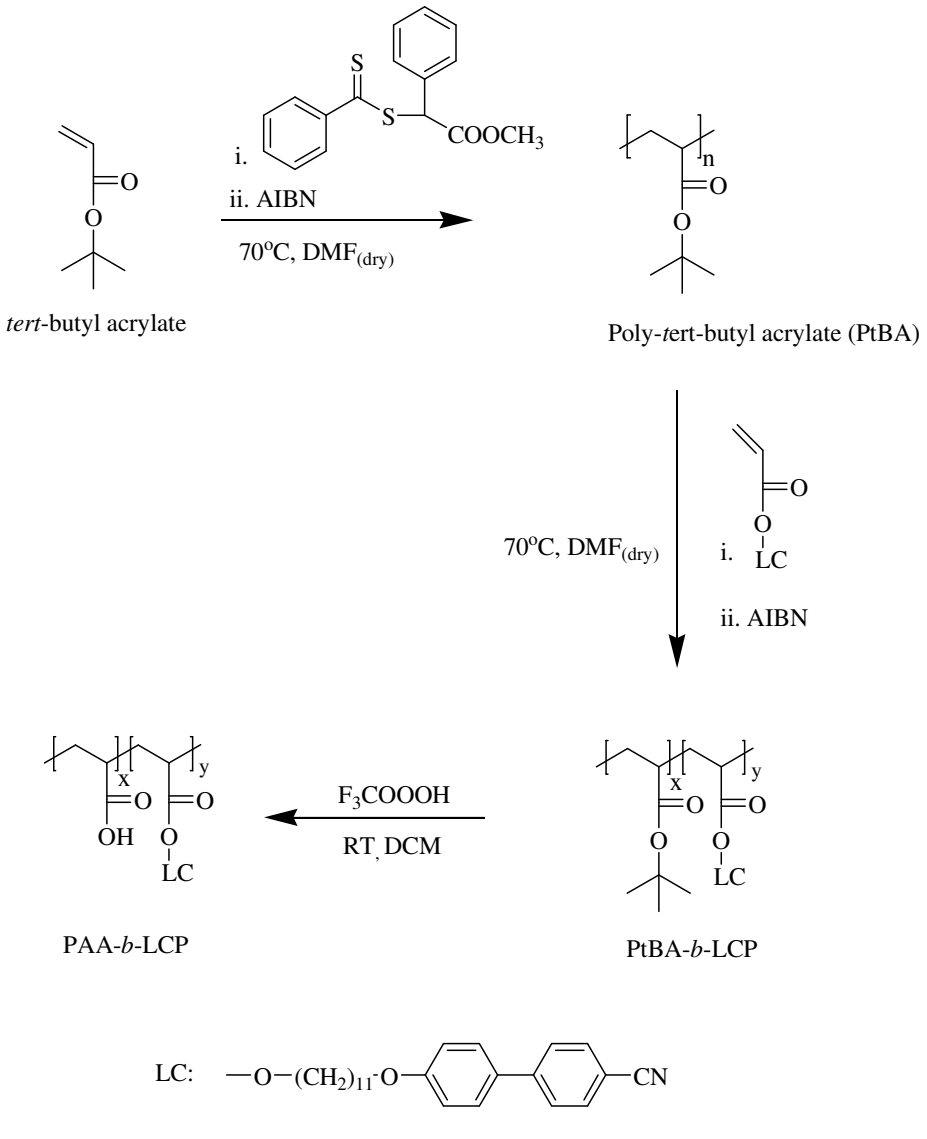
Synthesis of PAA-b-LCP: PAA-b-LCP was polymerized according a previously reported method. [1]Briefly, the chain transfer agent (CTA), S-methoxycarbonylphenyl-methyl dithiobenzoate(MCPDB) and the LC monomer, 4-cyanobiphenyl-4′-oxyundecylacrylate (LC 11) were synthesized by using our previously reported method. Scheme S1 shows the reversible addition–fragmentation chain transfer (RAFT) polymerization scheme for the synthesis of the macroinitiator, PtBA-b-MCPDB. MCPDB (19 mg, 0.06 mmol), ter-butyl acrylate (tBA) (1.28 g, 10 mmol) and DMF (1.5 mL) were added to a graduated vial, and the mixture was bubbled with dry nitrogen for 60 min. A Schlenk flask containing AIBN (5 mg, 0.02 mmol) was held under vacuum for 60 min, and the previously prepared solution containing tBA and CTA in DMF was then introduced into the flask by using a syringe needle previously purged with N_2. The flask was placed in an oil bath at 70 °C for 15 h for the RAFT reaction. The resulting macroinitiator, PtBA-b-MCPDB, was precipitated in a mixture of methanol/water (1:1, v/v). Scheme S1 shows the overall reaction scheme for the synthesis of PtBA-*b*-LCP. To synthesize PtBA-*b*-LCP via the RAFT method, AIBN (0.5 mg, 0.003 mmol), LC11 (84 mg, 0.2 mmol), and PtBA-b-MCPDB (110 mg, 0.004 mmol) were added to a Schlenk flask. The Schlenk flask was held under vacuum for 60 min, and DMF was then introduced into the flask by using a syringe needle previously purged with N_2. The flask was placed in an oil bath at 80 °C for 15 h. After the reaction was complete, the product was precipitated in mixture of methanol/water (1:1, v/v). Volatile materials were removed in a vacuum oven at 40 °C to yield powders. PtBA-b-LCP (0.1 g) was dissolved in dichloromethane (DCM, 5 mL), and TFA (TFA, 1 mL) was then added to cause a hydrolysis reaction. This reaction continued at 20 °C for 24 h with stirring. PAA-b-LCP was obtained after removing the by-products using a rotatory evaporator and was dried in a vacuum oven. The obtained PAA-b-LCP had a molecular weight of PAA(22k)-b-LCP(6k); the numbers in

the parenthesis represent the number-averaged molecular weight, and the molecular weight was measured by gel permeation chromatography (GPC). Detailed NMR and FT-IR data of PAA(22k)-b-LCP(6k) have been presented in our previous report.[1]



Scheme S1. RAFT polymerization scheme of PtBA-b-MCPDB and PAA-*b*-LCP.[1]

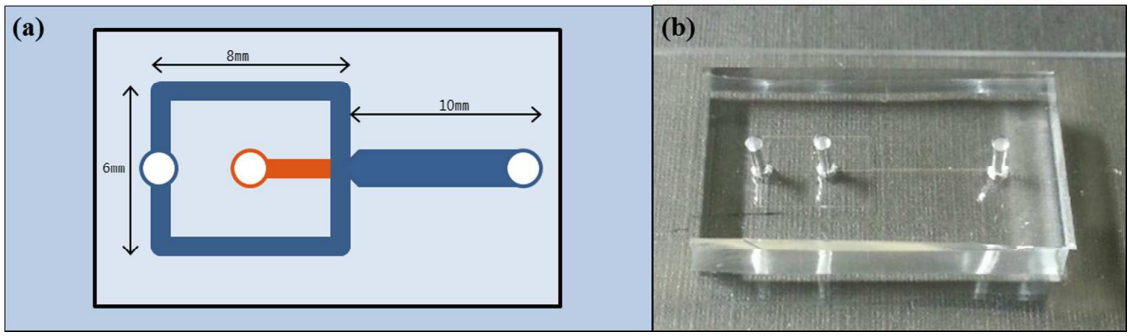


Figure S1 (a) Schematic representation of the microfluidic chip along with thedimensions and **(b)** a photograph of the microfluidic chip.

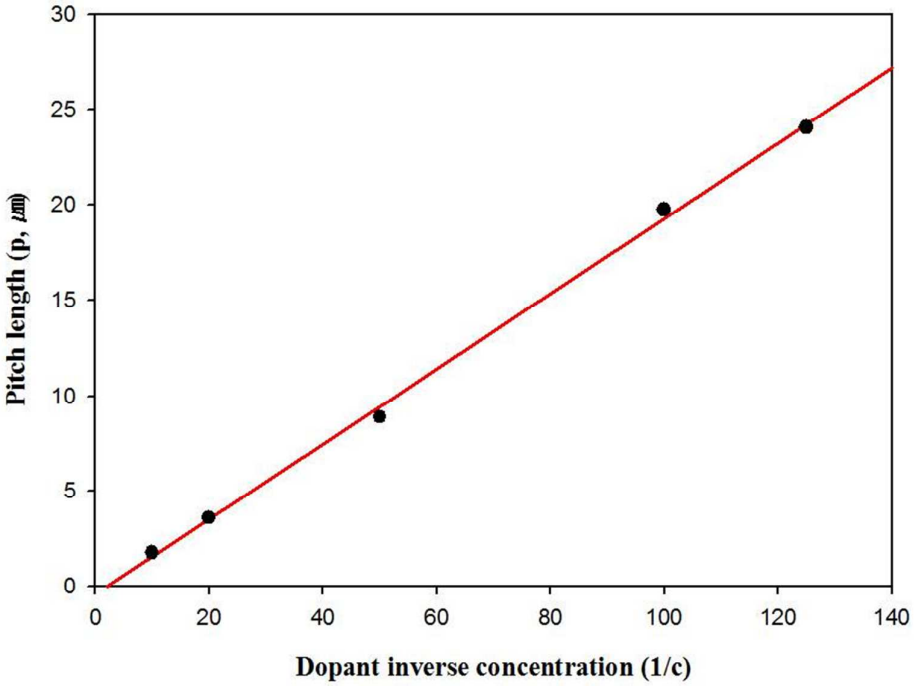


Figure S2. The plot of pitch vs. 1/c.

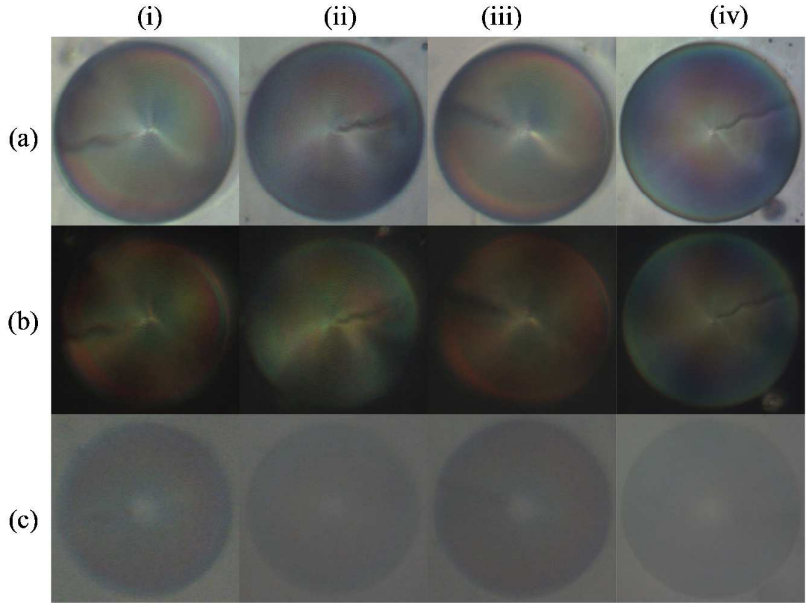


Figure S3. (a) Bright-field transmittance mode (b) Polarized optical microscope (c) Reflection images CLC_{PVA} droplets with ϕ = (i) 12, (ii) 14, (iii) 16, and (iv) 18wt% chiral

dopant.

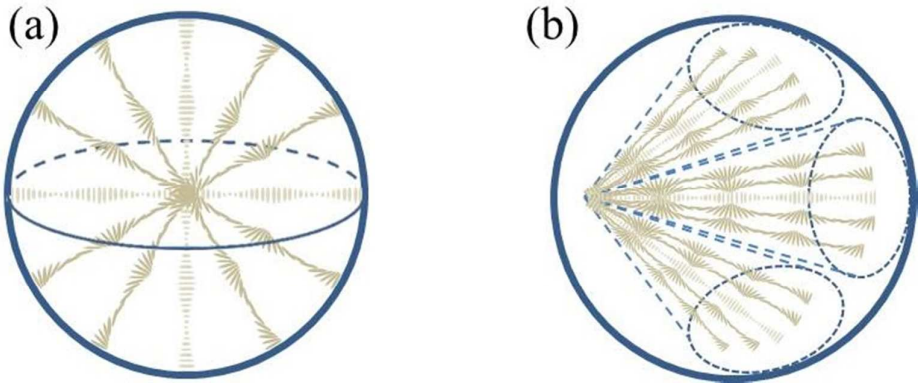


Figure S4. Models of **(a)** the CLC_{PVA} and **(b)** CLC_{SDS} droplets representing the parallel (planar) and perpendicular (homeotropic) anchoring at the droplet surface.

Figure SI 5 shows the orientation of the CLC in "chicken-skin" and "flashlight" structures. In case of chicken skin the orientation of CLC in microsphere shows resemblance with the dots on the skin of chicken, and some short domains are observed. While in case of flashlight a localized conical reflection with a variety of cone angles and large domains are observed[60].

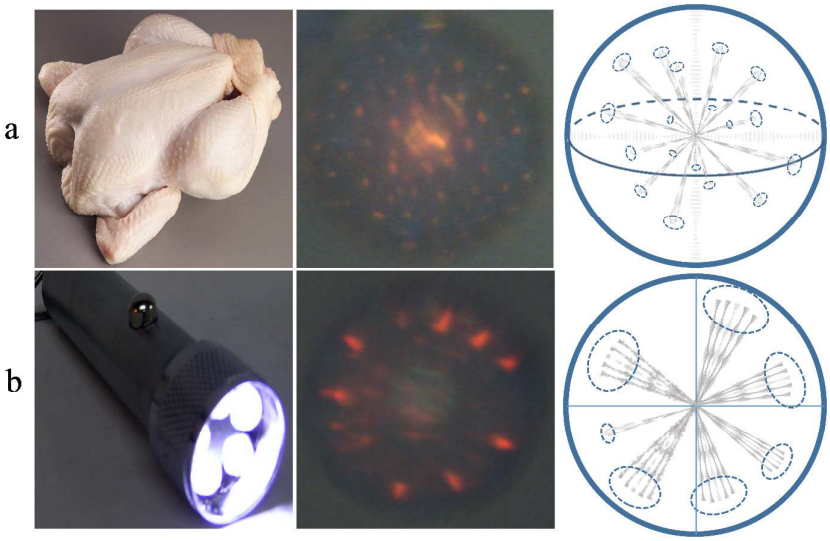


Figure S5.The orientation of CLC in (a) chicken skin and (b) flash light structures

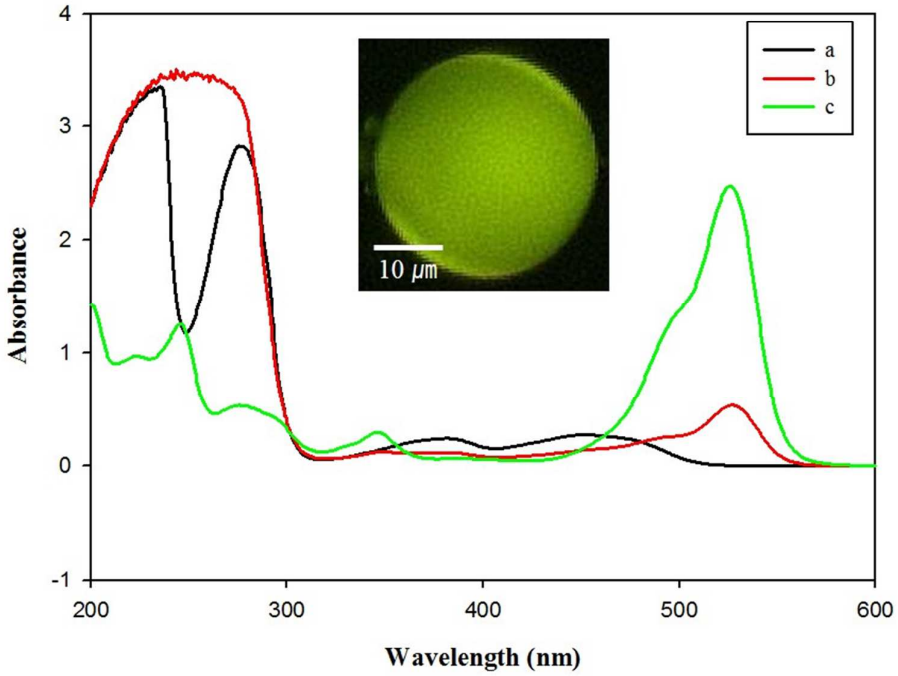


Figure S6.UV-Vis absorption spectra of (a) GOx, (b) GOx-rhd, and (c) rhodamine 6G.The inset image shows the droplet obtained upon excitation of the rhodamine fluorophore at a wave length of 365 nm, a clear green light observed

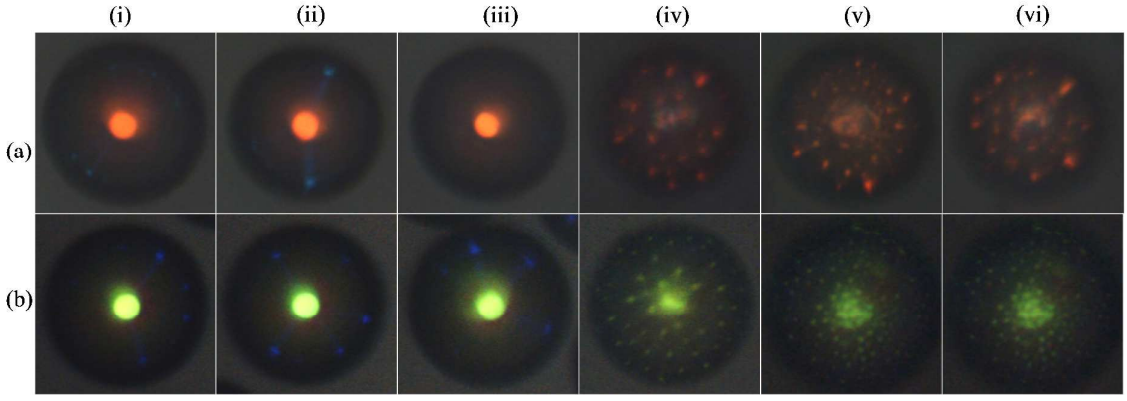


Figure S7. Bright-field reflection mode images of (a) $CLC_{PAA\text{-}GOx}$ (b) $CLC_{PAA\text{-}ChO}$ at different pH values (i) 4, (ii) 5, (iii) 6, (iv) 7, (v) 8, and (vi) 9.

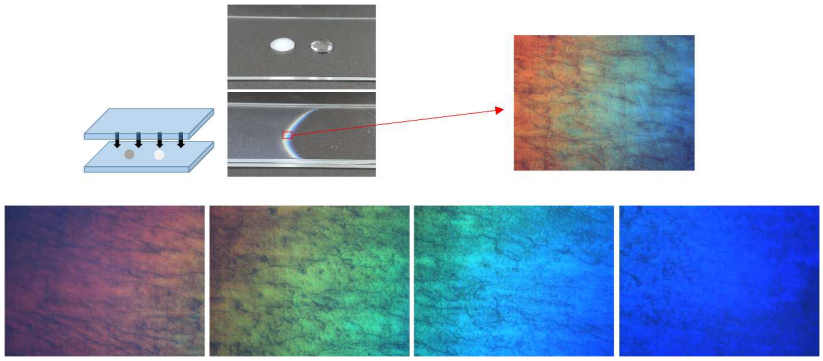


Figure S8. Miscibility of the MLC-2132 with chiral dopant CB15

References

1. Lee, D. Y.; Seo, J. M.; Khan, W.; Kornfield, J. A.; Kurji, Z.; Park, S. Y., pH-responsive aqueous/LC interfaces using SGLCP-b-polyacrylic acid block copolymers. *Soft Matter* **2010,***6* (9), 1964-1970.

60. Fan, J.; Li, Y.; Bisoyi, H. K.; Zola, R. S.; Yang, D.-k.; Bunning, T. J.; Weitz, D. A.; Li, Q., Light-Directing Omnidirectional Circularly Polarized Reflection from Liquid-Crystal Droplets. *Angewandte Chemie* **2015,***127* (7), 2188-2192.