Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Detection of Bile acids using Optical Biosensors based on Cholesteric Liquid Crystal Droplets

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Experiment:

To confirm whether the change in CLC configuration i.e., from homeotropic to planar transition is due to the bile acids or PVA, we have studied the detection of bile acids on plane glass substrate.

Microscope glass slides (1×1 cm^2) were cleaned and dipped in a solution of 5 mM $SC_{12}S$ aqueous solution for 1 hour at 100 ^oC. The $SC_{12}S$ induces homeotropic anchoring of LC. A 5 µL drop of CLC was placed on the glass slide using a pipette and the top side of CLC was air which also promote homeotropic anchoring in general. First the CLC showed homeotropic anchoring texture (Figure S1(a)) and after the addition of 50 µM DCA, due to the immiscibility of aqueous bile acid and CLC, CLC formed like emulsions. These emulsions took transition to planar anchoring characterized by central sport green reflection shown in Figure S1(b).

Here, we have confirmed that DCA molecules are solely responsible for triggering the transition to the planar anchoring in the absence of PVA.

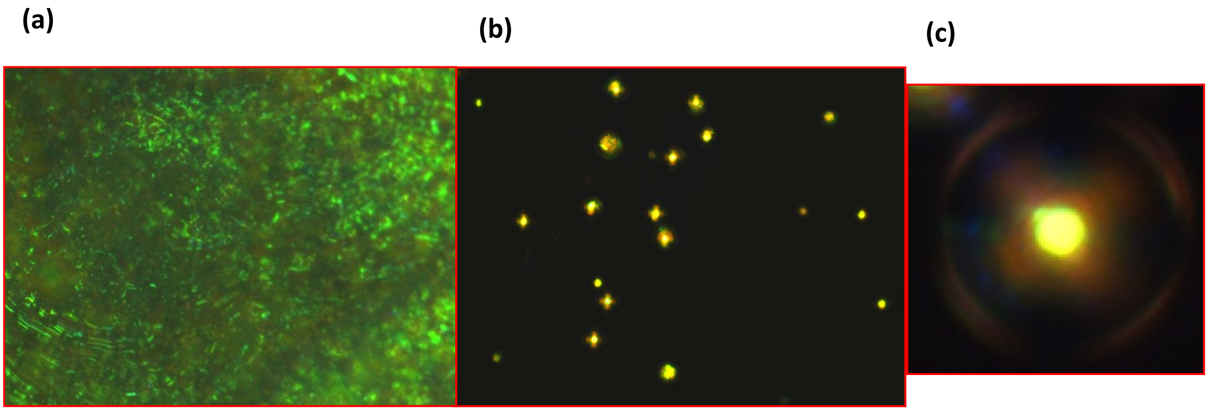

Figure S1. POM images of CLC Before (a) and after addition of 50 µM DCA (b). (c). Zoomed portion of b. The homeotropic to planar transition was triggered in the absence of PVA. The planar anchoring transition is mainly due to the DCA.

- **What happens without the PVA?**

We have tried with different concentrations of $SC_{12}S$ alone in producing droplets but the droplets after formation were not stable. Even previous reports are there which have reported $SC_{12}S$ in alone can't form stable emulsions[1,2]. Here, the role of PVA is to ensure stability of CLC droplets without coalescing. As shown in Figure S2(c), the droplets are deformed and sticked on the walls of vial (c(i)) whereas stable droplets are observed in the c(ii) which is in the presence of 1 wt% of PVA. In Fig. S2(a and b) we can observe the deformation of $SC_{12}S$ stabilized droplets compared to that of PVA and $SC_{12}S$ stabilized droplets.

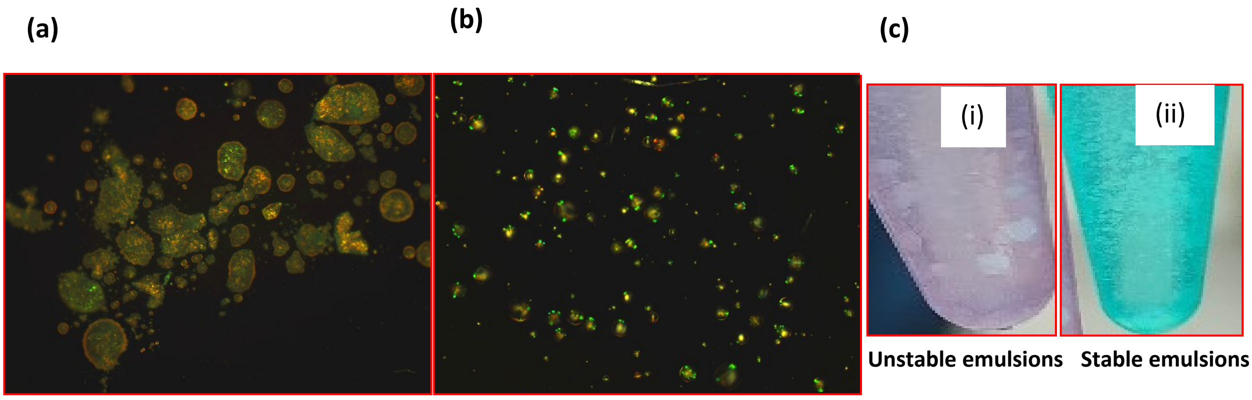

Figure S2. POM images of CLC droplets dispersed in (a). 5 mM $SC_{12}S$ and (b). solution of 1wt% PVA within 5 mM $SC_{12}S$. The $SC_{12}S$ droplets are unstable deforming within in an hour after production. (c). Photographs of CLC droplets produced by vortex mixing with 5 mM $SC_{12}S$ (Unstable emulsions) and 5 mM $SC_{12}S$+1wt% PVA (Stable emulsions). In c(i), droplets are deformed and sticked to the vial surface. In c(ii) the presence of PVA stabilized the droplets in spherical shape and no deformation was observed.

References

1 X. Han, D. Han, J. Zeng, J. Deng, N. Hu and J. Yang, *Microchem. J.*, 2020, **157**, 105057.

2 H. G. Lee, S. Munir and S. Y. Park, *ACS Appl. Mater. Interfaces*, 2016, **8**, 26407–26417.