ARTICLE

# Electronic Supporting Information for

# The association of structural chirality and liquid crystal anchoring in polymer stabilized cholesteric liquid crystals

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**Fig. S1** Synthetic pathway for the dichroic monomer

**Synthesis of 4,7-bis(4-methoxyphenol)benzo-2,1,3-thiadazole**

Dibromobenzothiadazole (2.94 g, 10 mmol), 4-methoxyphenylboronic acid (3.80 g, 25 mmol) and $Pd(Ph_3)_4$ (0.87 g, 0.75 mmol) were added to a round bottom flask fitted condenser. The flask was placed under vacuum and refilled with nitrogen. 1,4-dioxane (52.5 mL) was added via syringe along with $K_2CO_3$ (4.15 g, 30 mmol) dissolved in $H_2O$ (15 mL). The reaction was held at 110°C for 72 hours. After cooling to room temperature the product was recrystallized in a 1:1 DCM:Hexane mixture at 0°C. The total yield was 3.17g (90.6 %). $^1$H-NMR ($CDCl_3$, 400 MHz): 7.96 (d, 4H), 7.75 (s, 2H), 7.11 (d, 4H), 3.93 (t, 6H).

**Synthesis of 4,7-bis(4-hydroxyphenyl)benzo-2,1,3-thiadazole**

4,7-bis(4-methoxyphenol)benzo-2,1,3-thiadazole was (1.37 g, 3.94 mmol) and tetrabutylammonium bromide (1.27 g, 3.94 mmol) were added to a round bottom flask connected to a condenser. HBr (33 % in AcOH, 30 mL) was added, the mixture was heated for 24 hours at 100°C. After cooling to room temperature 150mL of water was added. The solution was diluted with 0.1 M NaOH solution. The precipitate was collected, dissolved in DCM, then washed 3x with DI $H_2O$. After evaporating the solvent 0.97 g of product was collected (77 % yield). $^1$H-NMR (DMSO, 400 MHz): 9.72 (s, 2H), 7.88 (d, 4H), 7.82 (s, 2H), 6.94 (d, 4H).

**Synthesis of 6-bromohexyloxy acrylate**

6-bromo-1-hexanol (7.25 g, 40mmol), acrylic acid (3.75 g, 52 mmol), and p-toluenesulfonic acid (PTSA) (610 mg, 3.20 mmol) was dissolved in 100 mL of toluene in a round bottom flask. The flask was connected to a dean-stark and condenser, the temperature was kept at 125°C for 48 hours. After cooling to room temperature the solution was washed 3x with $K_2CO_3$ solution (5 %w/w) and 3x with brine. The organic phase was collected, dried over $MgSO_4$, filtered and the solvent was evaporated for a yield of 6.83 g (73 %). $^1$H-NMR ($CDCl_3$, 400 MHz): 6.42 (dd, 1H), 6.14 (dd, 1H), 5.84 (dd, 1H), 4.18 (t, 2H), 3.43 (t, 2H), 1.89 (m, 2H), 1.71 (m, 2H), 1.55-1.49 (m, 4H).

**Synthesis of 4,7-bis((4-hexyloxy acrylate)phenyl)benz0-2,1,3-thiadazole**

4,7-bis(4-hydroxyphenyl)benzo-2,1,3-thiadazole (0.97 g, 3 mmol), $K_2CO_3$ (1 g, 7.5 mmol), and 6-bromohexyloxy acrylate(1.56 g, 6.66 mmol) was dissolved in 20 mL of DMF in a round bottom flask connected to a condenser. The temperature was held at 90°C for 24 hours. After cooling to room temperature 160 mL of $H_2O$ was added. The solution was extracted with DCM. The collected organic solution was dried with $MgSO_4$ and the solvent was evaporated off. The final product yield of the dichroic monomer was 1.82 g (96 %), $^1$H-NMR ($CDCl_3$, 400 MHz): 7.93 (d, 4H), 7.74 (s, 2H), 7.07 (d, 4H), 6.43 (dd, 2H), 6.15 (dd, 2H), 5.85 (dd, 2H), 4.21 (t, 4H), 4.08 (t, 4H), 1.90 (m, 4H), 1.75 (m, 4H), 1.56-1.47 (m, 8H).

 

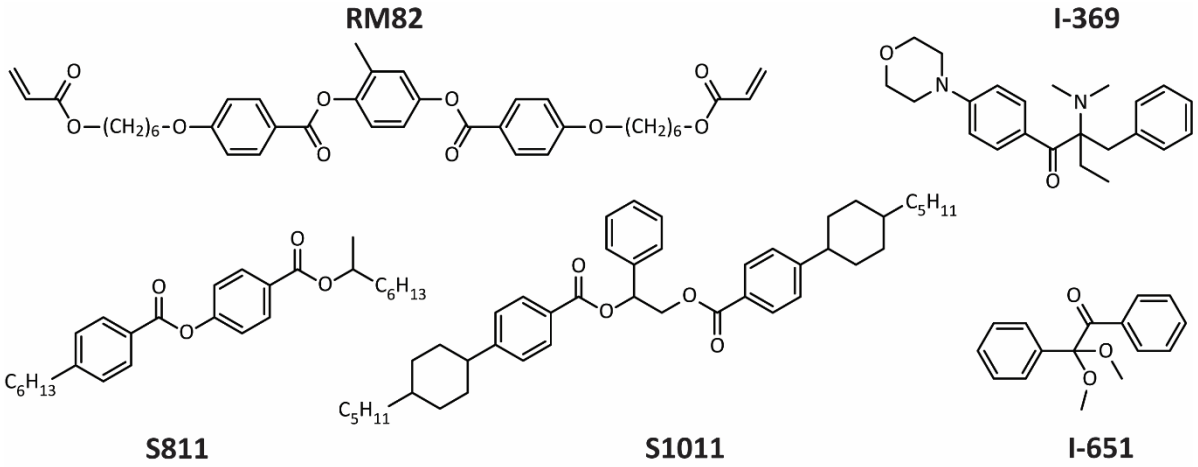


**Fig. S2** Chemical structures of the other chemicals used in this study. RM82, the liquid crystalline monomer, S811 and S1011 the left-handed chiral dopants, and the radical photoinitiators I-369 and I-651.

**Fig. S3** Absorption spectra for the nematic liquid crystalline mixture. The LC Host is the eutectic mixture described in the methods section. (s) polarization was perpendicular to the nematic director and (p) polarization was parallel to the director. The DC monomer scans contains 0.02 wt% of the monomer. The Coumarin-314 scans contain 0.02 wt% of the dye, the NLC mix contains both dyes (0.02 wt% DC monomer, 0.01 wt% Coumarin-314). All samples are polymer stabilized and contain 6wt% of liquid crystalline monomer and 0.5 wt% I-369.

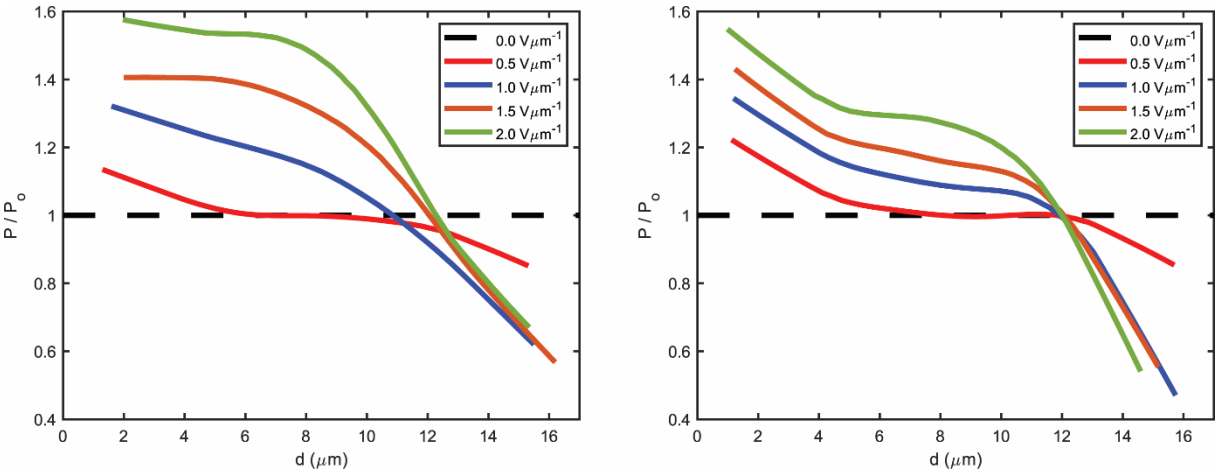


**Fig S4** Normalized pitch length as a function of depth for various voltages for the samples described in Fig. 4. (Left side) PSCLC polymerized at room temperature and (right side) PSCLC polymerized at 60°C.