Electronic Supplementary Material (ESI) for Soft Matter.

Supporting information

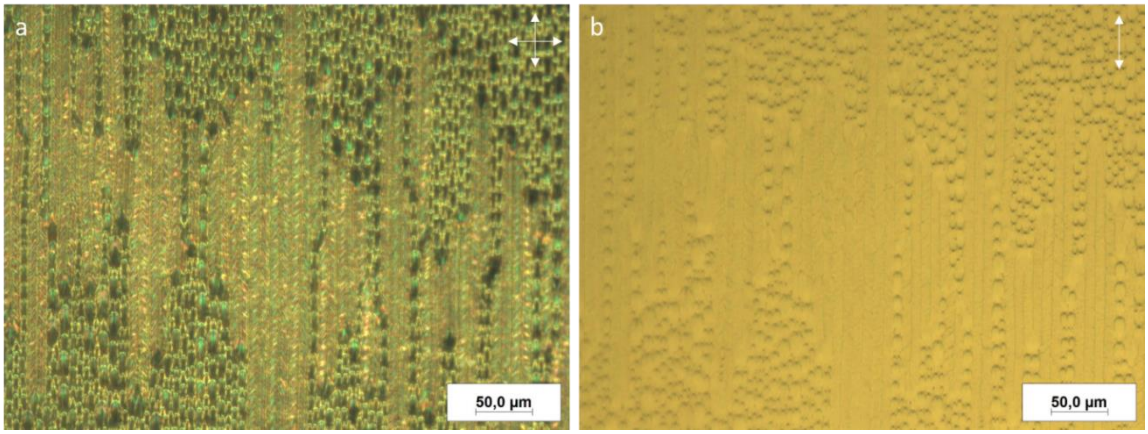

Figure SI 1: CB7CB/8CB (60:40) in a 10 µm thick planar cell. a) Coexistence of rope-like texture and FCDs observed using crossed polarisers. b) Same area as in a) without the analyser. The singular lines of FCDs are visible and singular lines in the rope-like texture can be guessed too, which suggests that ropes are also topological defects.

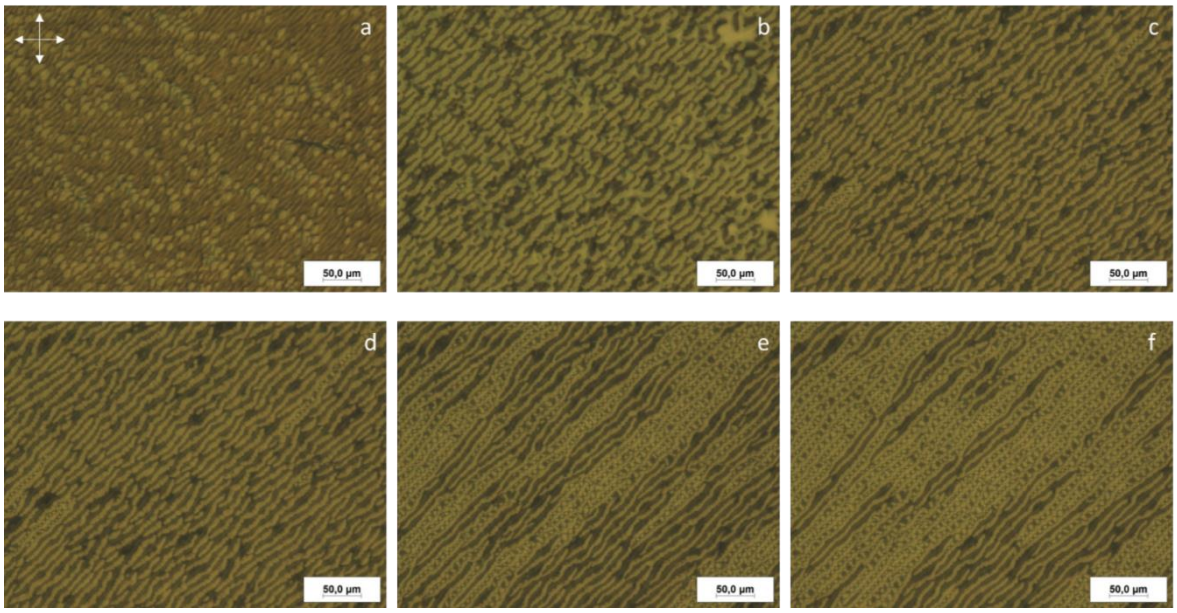

Figure SI 2: Formation of double helices in a type 3 sample. Temperature cycles between 11.2°C and 0°C, in the N_{TB} phase, with rate varying between 1°C/min and 10°C/min, were applied to make double helices grow. a) 10.2°C, after 1 temperature cycle; b) 11.4°C after 2 cycles; c) 10°C after 7 cycles; d) 10°C after 9 cycles; e) 11.2°C after 37 cycles; f) 11.2°C after 40 cycles.

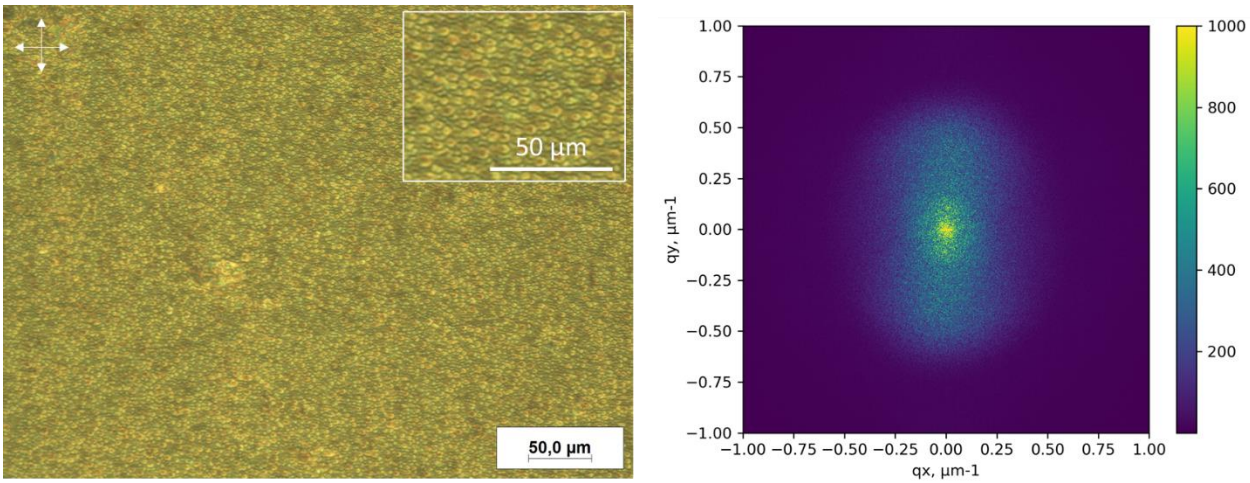

Figure SI 3: Left: POM image of a type 1 sample between crossed polarisers (white cross) after polymerisation at 20°C. Right: Fourier transform of the POM image.

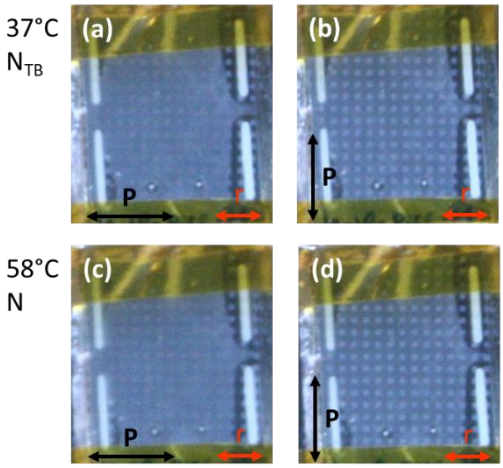

Figure SI 4: Effect of the angle between the polariser axis and the rubbing axis on the scattering power in the N_{TB} phase (37°C, a and b) and in the N phase (58°C, c and d).

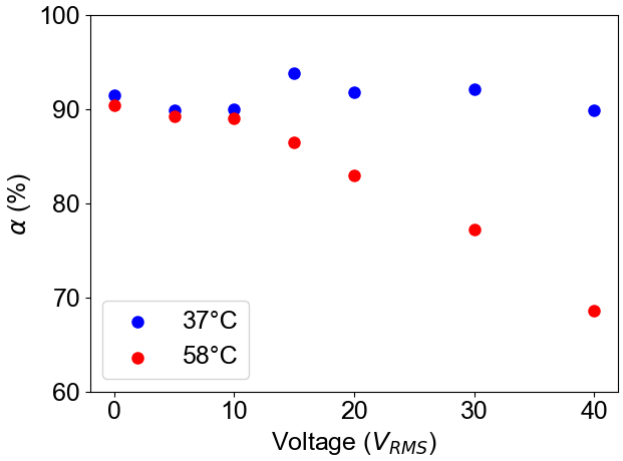

Figure SI 5: Dependence of the scattering power (α) on the voltage in the N_{TB} (37°C) and N (58°C) phases, when the polariser is parallel to the rubbing axis.

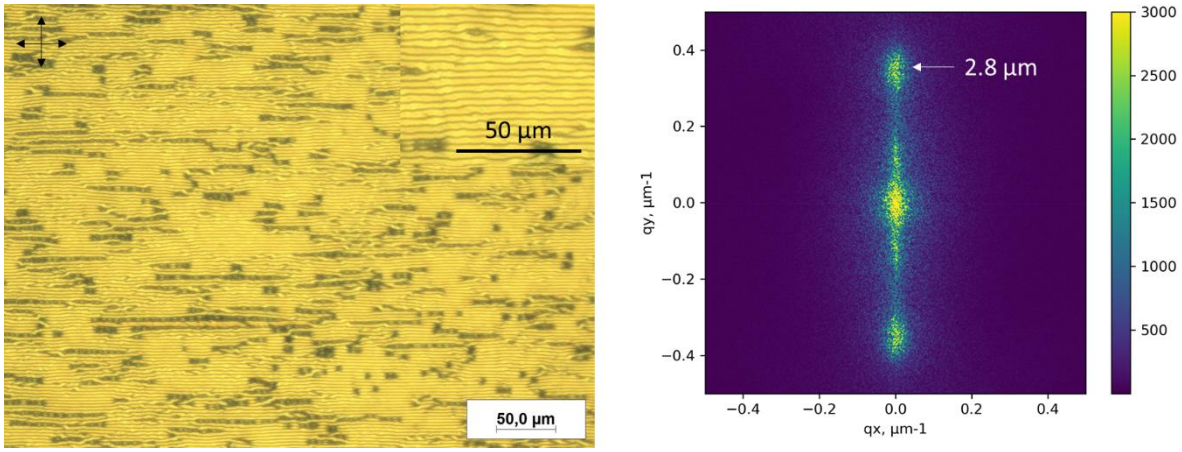

Figure SI 6: Left: POM image of a type 2 sample between crossed polarisers after polymerisation at 25°C. Right: Fourier transform of the POM image.

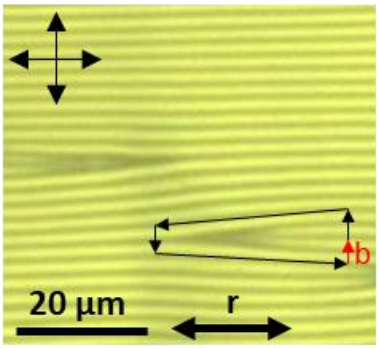

Figure SI 7: The rope-like texture only shows dislocations with a Burger's vector of twice the stripe period. 3 µm thick cell, planar anchoring, CB7CB/8CB (60:40), ST03021 (5%), DMPA (3%). This suggests that although the Fourier analysis gives a period of 2.8 µm, the real period is probably 5.6 µm. Indeed, a faint herringbone pattern is hardly observed, but the contrast of the POM images is not strong enough to affect the Fourier transform of Figure SI 4, right.

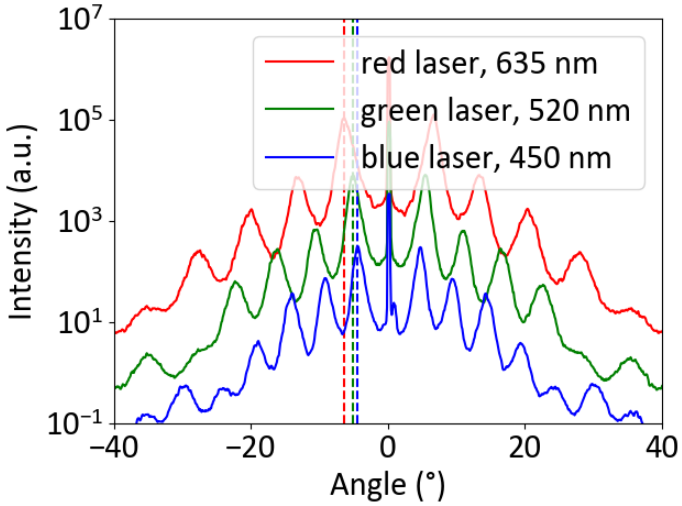

Figure SI 8: Diffraction patterns of a type 2 sample by three lasers: red, green and blue. The first order is shifted as the wavelength increases: -6.4° for the red laser, -5.1° for the green laser, -4.4° for the blue laser.

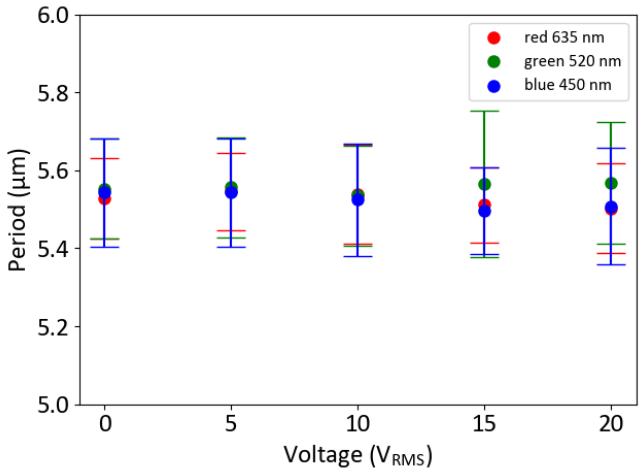

Figure SI 9: Dependence on the voltage of the period of a type 2 sample for three laser wavelengths.

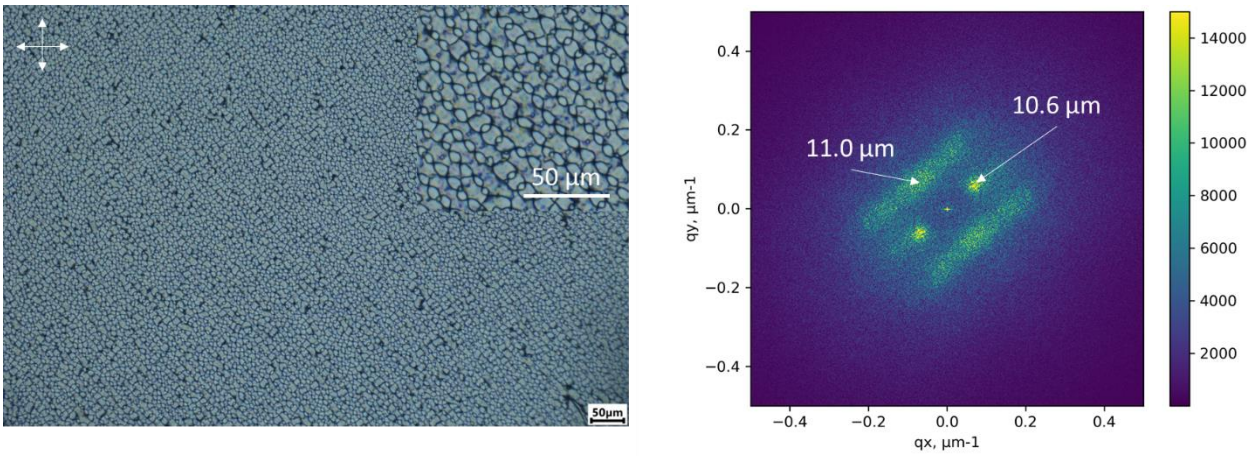

Figure SI 10: Left: POM image of a type 3 sample between crossed polarisers after polymerisation at 20°C. Right: Fourier transform of the POM image.

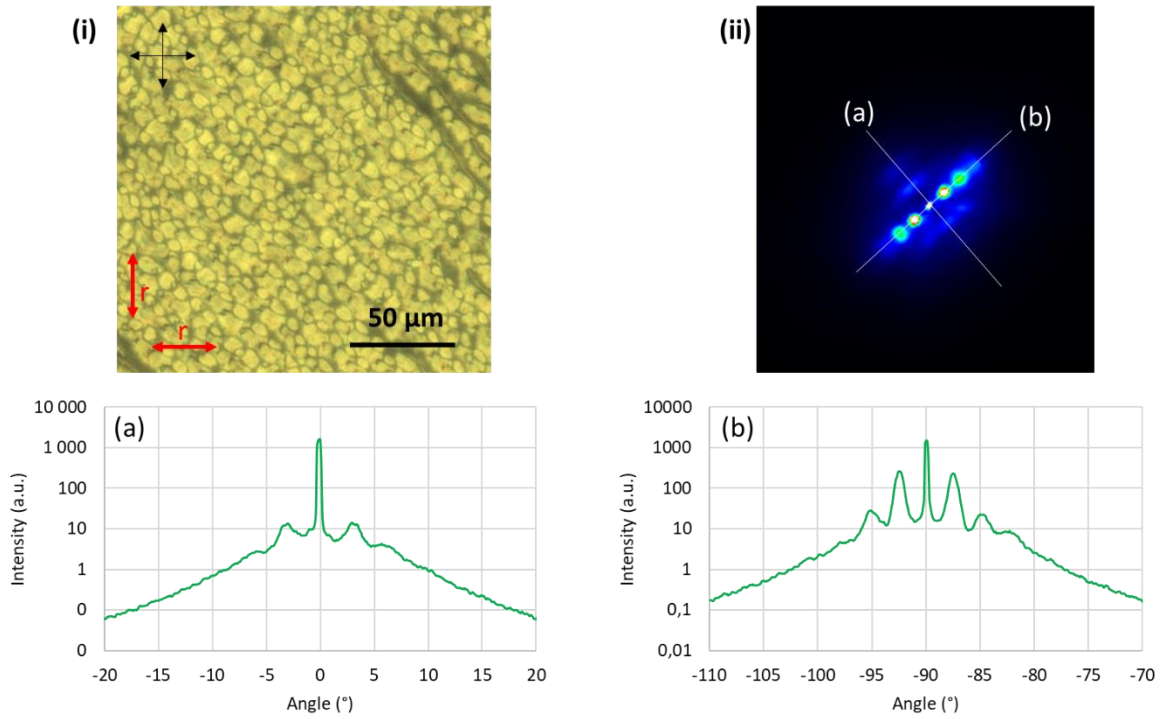

Figure 11: (i) POM image of a type 3 sample between crossed polarisers. The rubbing axes are shown in red. (ii) Laser diffraction pattern by a type 3 sample (green circularly polarised laser, λ=520 nm). Colours vary from black (low intensities) to white (high intensities). (a) Transmission profile along line (a) in (ii). (b) Transmission profile along line (b) in (ii).

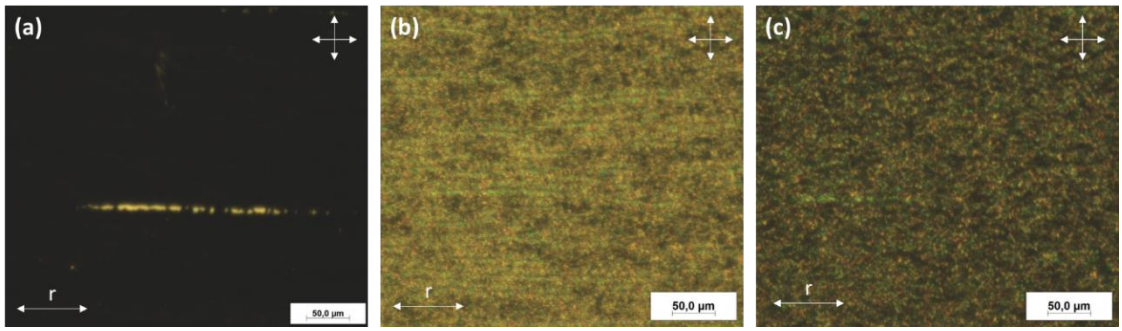

Figure SI 12: 10 µm thick cell, planar anchoring, filled with a mixture of CB7CB/8CB (40:60), ST03021 (2 wt%) and DMPA (3 wt%) observed under POM between crossed polarisers. (a) At 50°C, in the nematic phase, before polymerisation; (b) at 35°C, in the N_{TB} phase, after polymerisation; (c) at 50°C, in the nematic phase, after polymerisation. The textures in the N phase are very different before and after polymerisation, which proves that a polymer network has formed. However, it is not dense enough to perfectly maintain the defects of the N_{TB} phase in the N phase. More than 2 wt% of monomer is therefore required for this purpose.

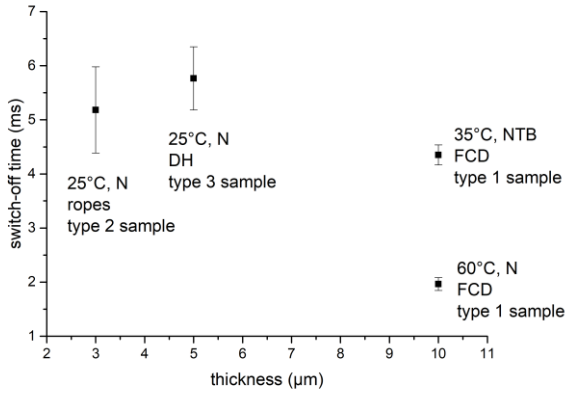

Figure SI 13: Dependence of the switch-off time on the cell thickness.

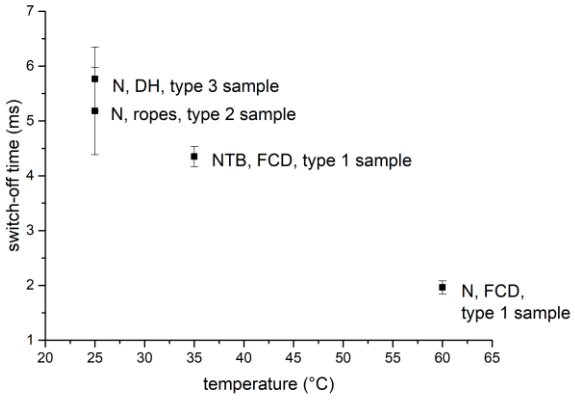

Figure SI 14: Dependence of the switch-off time on the temperature.

The switch-off (τ_D) time does not seem to depend very much on either the cell thickness or the texture (Figure SI 13), as the type 2 sample (rope-like texture, 3 µm) has a switch-off time of 5.2 ± 0.8 ms and the type 3 sample (DH texture, 5 µm) has a similar switch-off time of 5.8 ± 0.6 ms. The two samples have the same chemical composition and the measurements were made at the same temperature (25°C, nematic phase). Here, the switch-off time does not depend on the cell thickness probably because the characteristic distance to be considered is the mesh size of the polymer network.

In addition, as expected, the switch-off time decreases with increasing temperature (Figure SI 14): 5.2 ± 0.8 ms and 5.8 ± 0.6 ms (25°C, N), 4.4 ± 0.2 ms (35°C, N_{TB}), 2.0 ± 0.1 ms (60°C, N).