crystals

MDPI

Supplementary Materials

Chemical-physical characterization of binary mixtures of a twist bend nematic liquid crystal with smectogens

Abir Aouini [1,2], Maurizio Nobili [2], Edouard Chauveau [2], Philippe Dieudonné-George [2], Gauthier Damême [3], Daniel Stoenescu [1], Ivan Dozov [4] and Christophe Blanc [2,*]

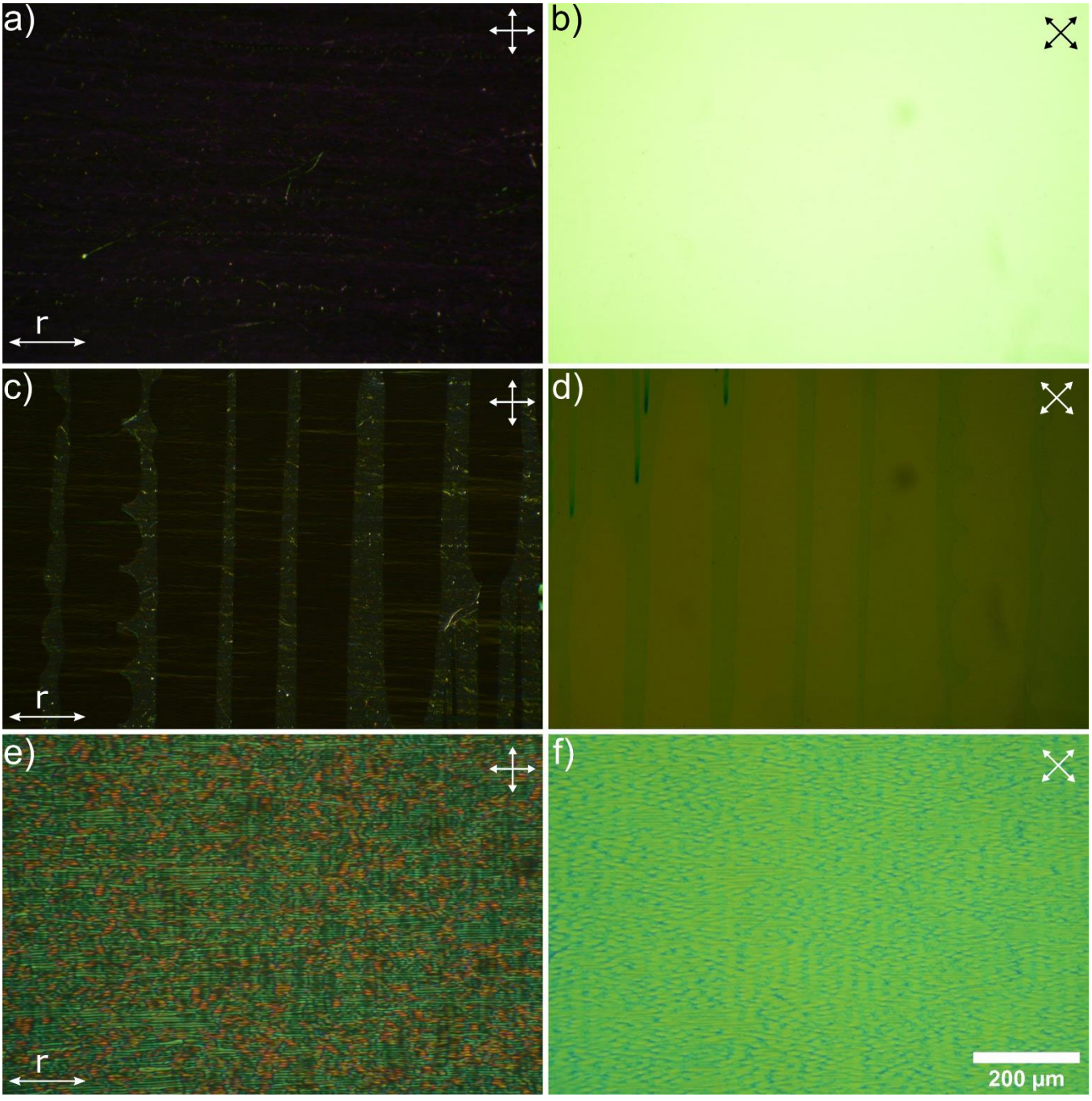

Figure S1. Polarizing optical micrographs of CB7CB observed at different temperatures in a planar cell (EHC, 10µm). **(a)** and **(b)** Nematic phase at 105°C. **(c)** and **(d)** Multiples domains of N_{TB} phase appearing in the N phase during the N/ N_{TB} transition at 104°C. The difference between the two phases is quite visible. **(e)** and **(f)** N_{TB} phase observed at 102°C. Crossed polarizers, r indicates the rubbing direction.

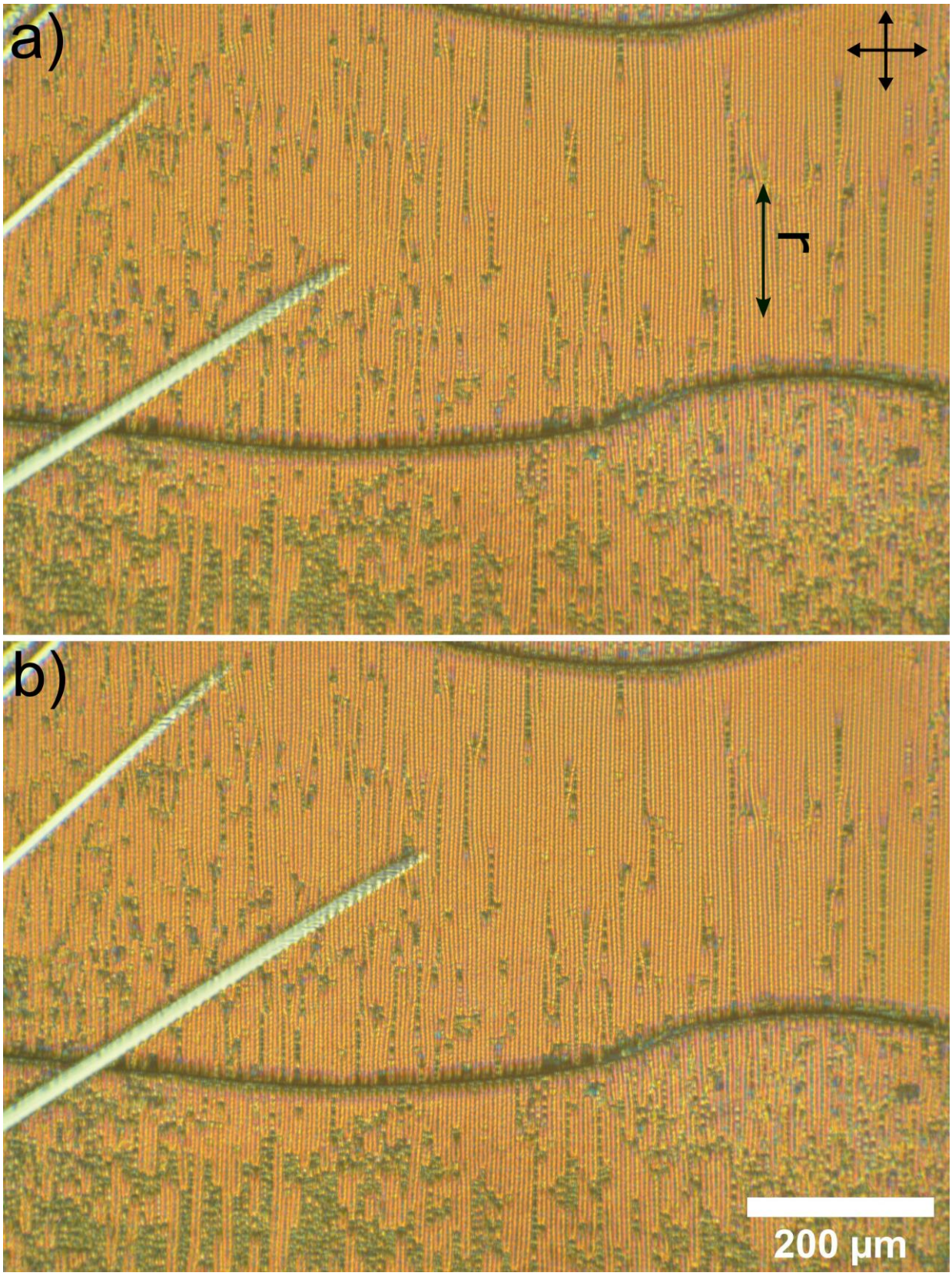

Figure S2. (a) Growth of needle crystals in the N_{TB} phase of CB7CB at 95°C in a planar cell (EHC, thickness 10µm). The crystallization was induced by a CB7CB crystal seed in contact with the periphery of the cell (at a distance about 10mm). **(b)** Image of the same region taken 1 min later. The crystal growth velocity is thus about 100µm.min^{-1} and the cell totally crystallizes in several hours. Crossed polarizers, r indicates the rubbing direction.

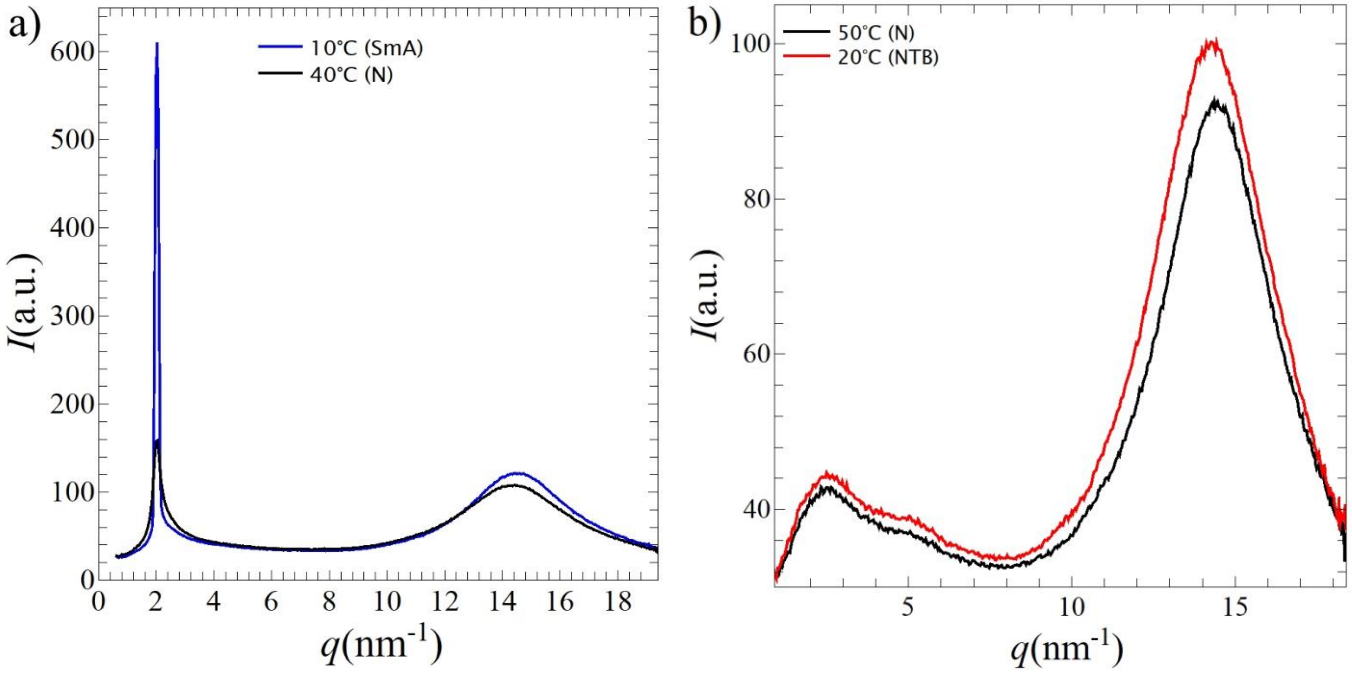

Figure S3. X-rays diffracted intensities of 8CB/CB7CB mixtures as a function of wave vector q. **(a)** Mixture at a concentration $\phi = 10.3$ wt% of CB7CB in SmA phase at 10°C and in N phase at 40°C. **(b)** Mixture at a concentration $\phi = 54.9$ wt% of CB7CB in N_{TB} phase at 20°C and N phase at 50°C.

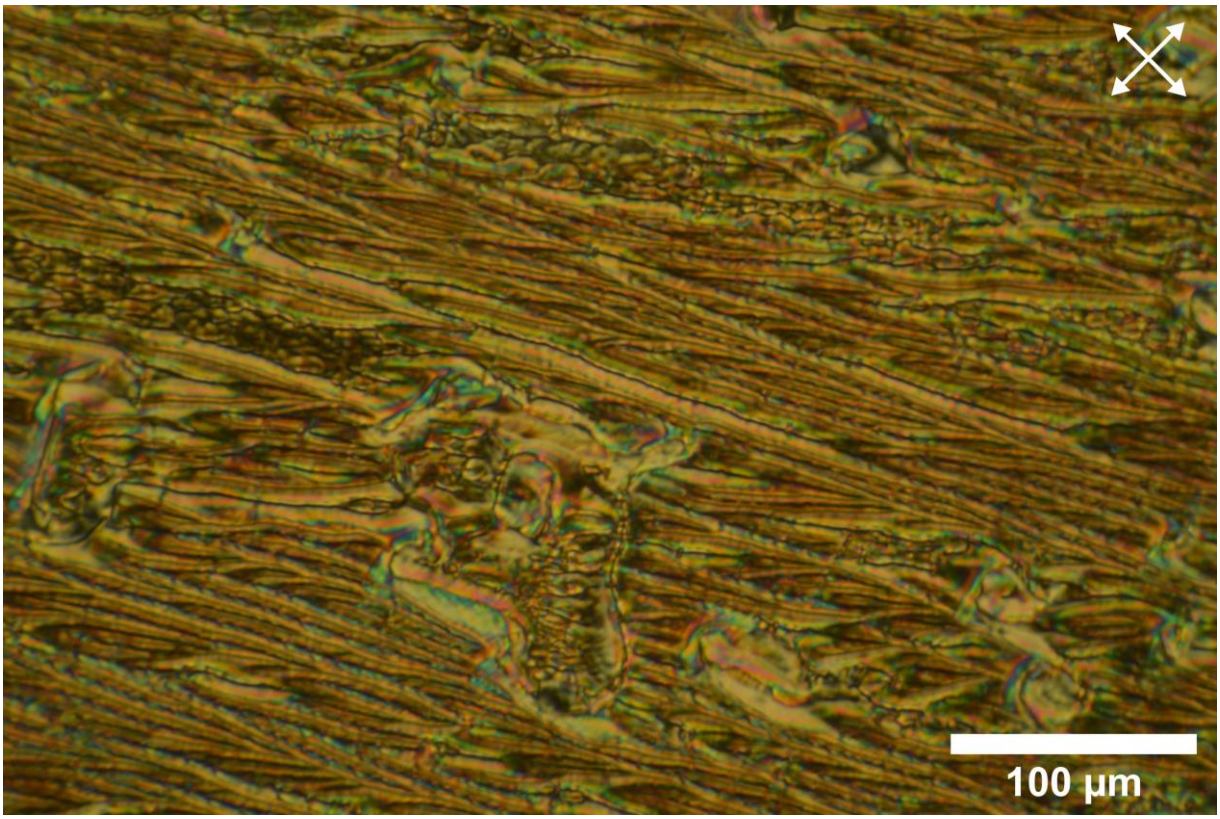

Figure S4. POM of the N_{TB} phase of a 8CB/CB7CB mixture ($\phi = 25$ wt%) at -20°C. Crossed polarizers.

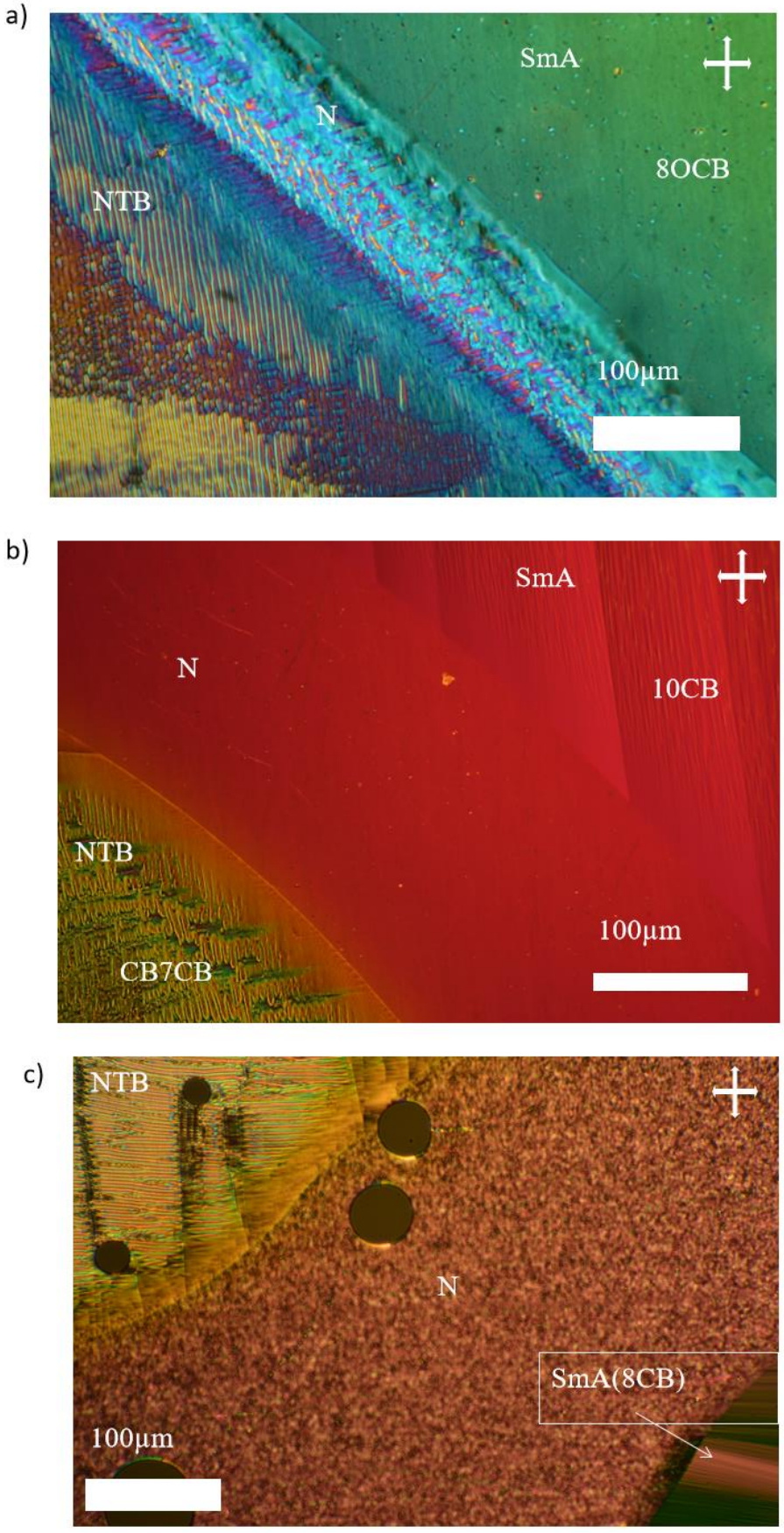

Figure S5 Contact experiments at room temperature of various smectogens -**(a)** 8OCB, **(b)** 10CB, **(c)** 8CB- with CB7CB. In the vicinity of the contact we never observed a N_{TB}/SmA front interface but the sequence SmA-N-N_{TB} phases (POM).

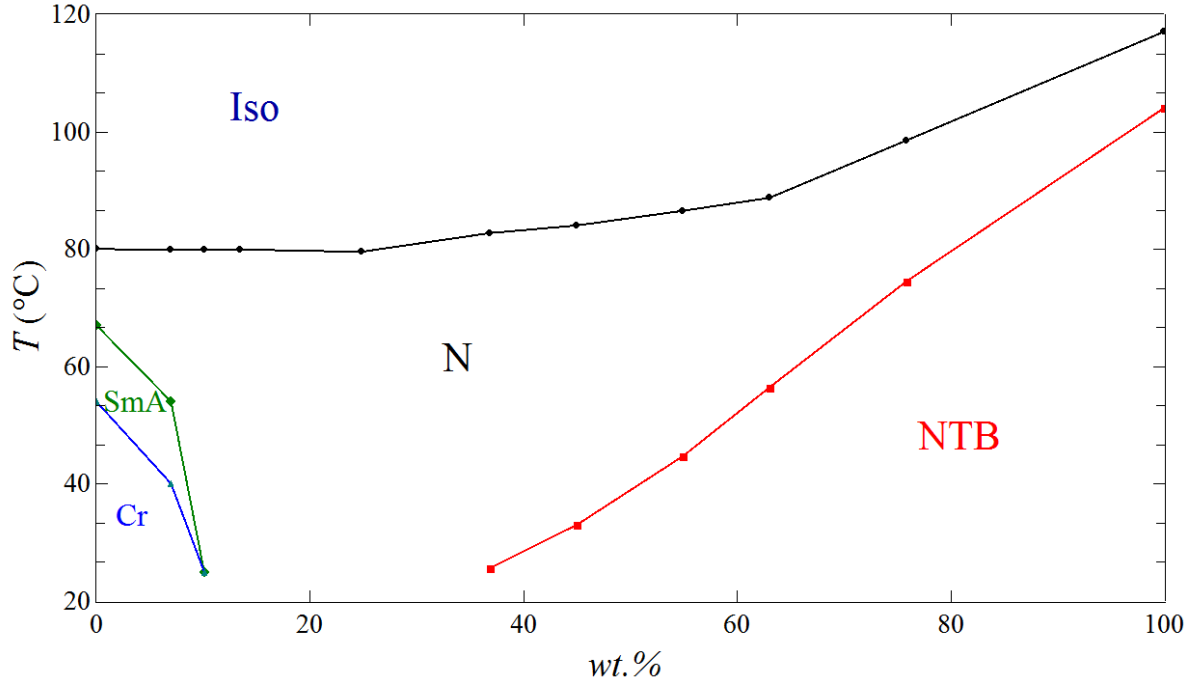

Figure S6 Partial phase diagram of the 8OCB/CB7CB binary system.

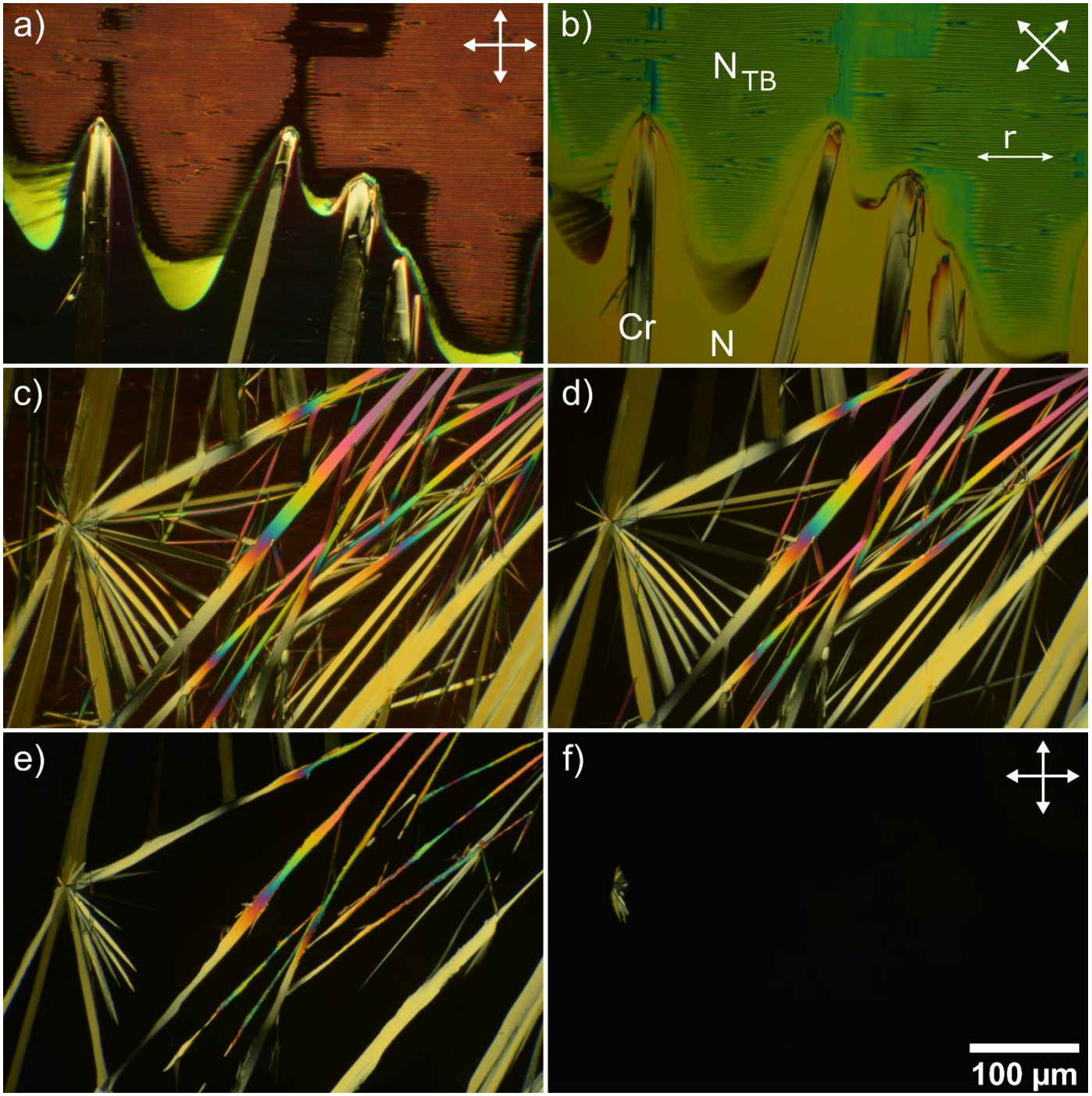

Figure S7. POM of an 8CB/CB7CB mixture (50/50 wt%) in a10µm thick cell. **(a,b)** Destabilization at 26°C of the N_{TB} phase towards needle crystals and a N phase. The destabilization was induced by a crystal seed of CB7CB momentarily in contact with the periphery of the cell (at a distance of a few mm of the observed zone). **(c)** After a few hours at 26°C, an equilibrium state is reached. **(d,e,f)** Under rapid heating conditions (5 °C.min^{-1}), the N phase of this zone transformed into the isotropic phase at about 56°C **(d)**. The melting of the crystals was observed at higher temperatures (76°C in **(e)**) and was almost complete when reaching 86°C **(f).** Micrographs obtained with crossed polarizers. The double arrow indicates the rubbing direction of the cell.

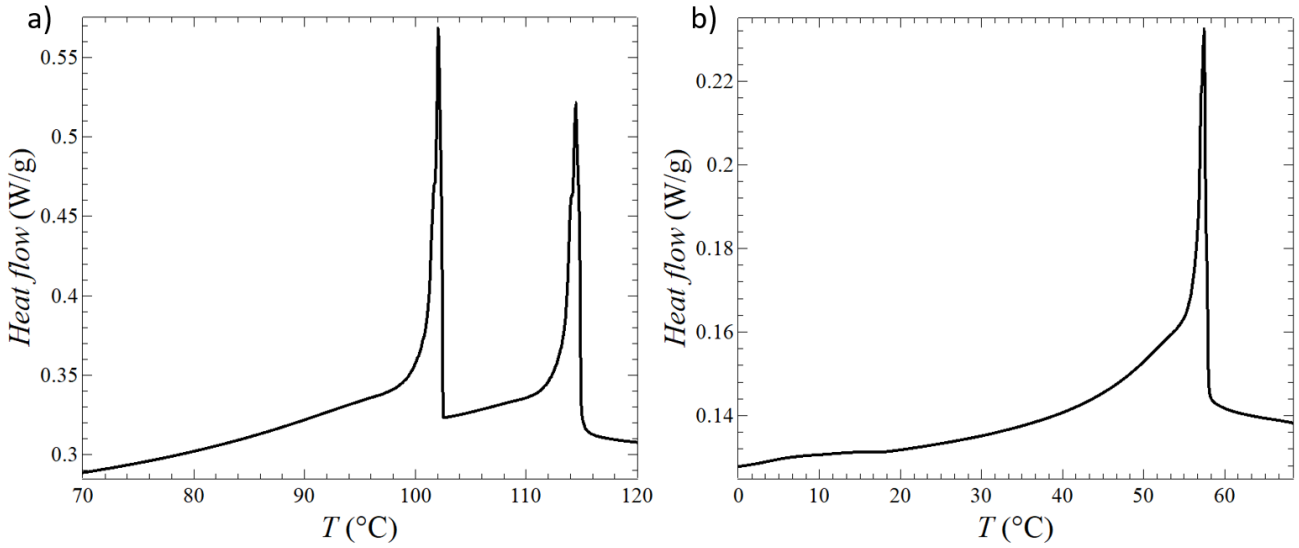

Figure S8. (a) Heat flow curve of pure CB7CB is characterized by two distinct peaks of similar magnitude corresponding respectively to the Iso/N and N/N$_{TB}$ phase transitions. **(b)** A mixture at concentration ϕ=43 wt% still displays a strong Iso/N phase transition peak but the N/NTB one is barely visible, in the shape of a broad weak hump.

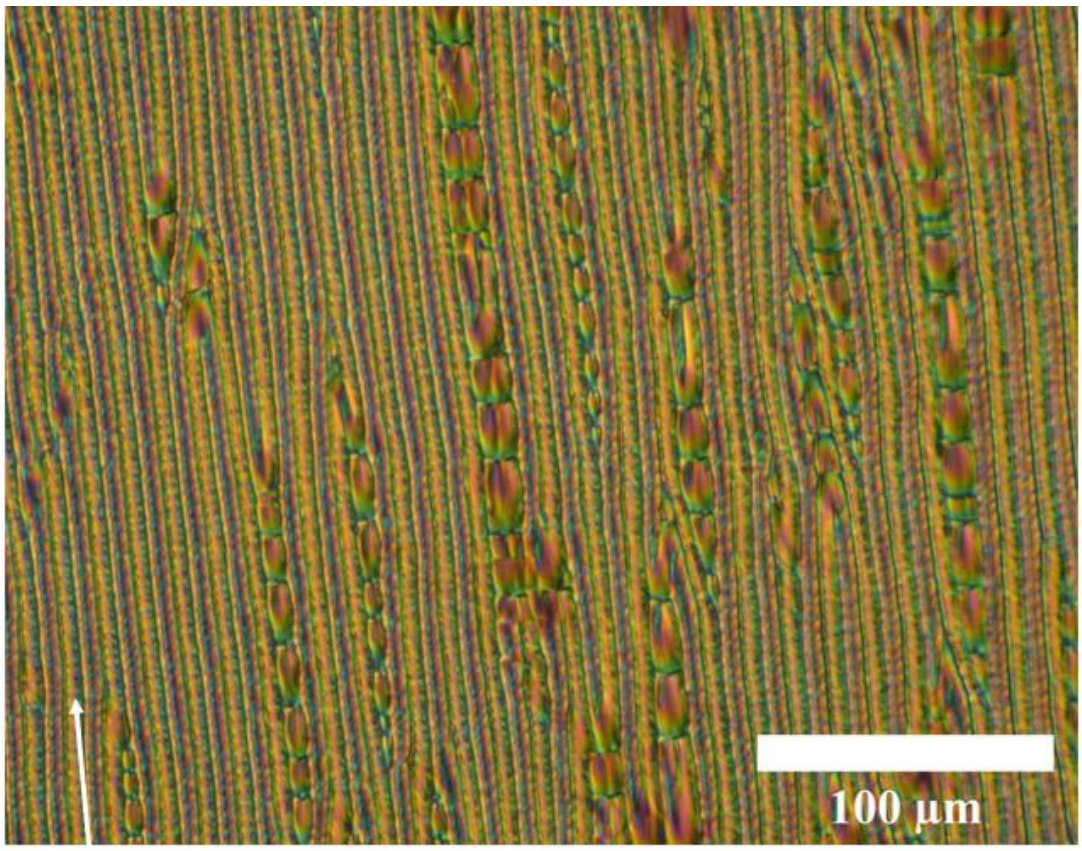

Figure S9. POM texture at room temperature of the 8CB/CB7CB binary system at a concentration $\phi = 50$ wt%. The N$_{TB}$ phase shows the typical stripes and ropes textures. Planar anchoring: the arrow indicates the rubbing direction of the PVA layers.