Electronic Supplementary Material (ESI) for Soft Matter.

Supporting Information

Effects of Terminal Flexible Chain in Hydrogen-Bonded Chiral Switches on Phototunable Behavior of Chiral Nematic Liquid Crystals: Helicity Inversion and Phase Transition

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Fig. S1 shows variable-temperature FT-IR spectra in low temperature range from 20 to 80 °C of these four H-bonded chiral switches. We still observe that the intensities of these two characteristics peaks decrease with the temperature increasing.

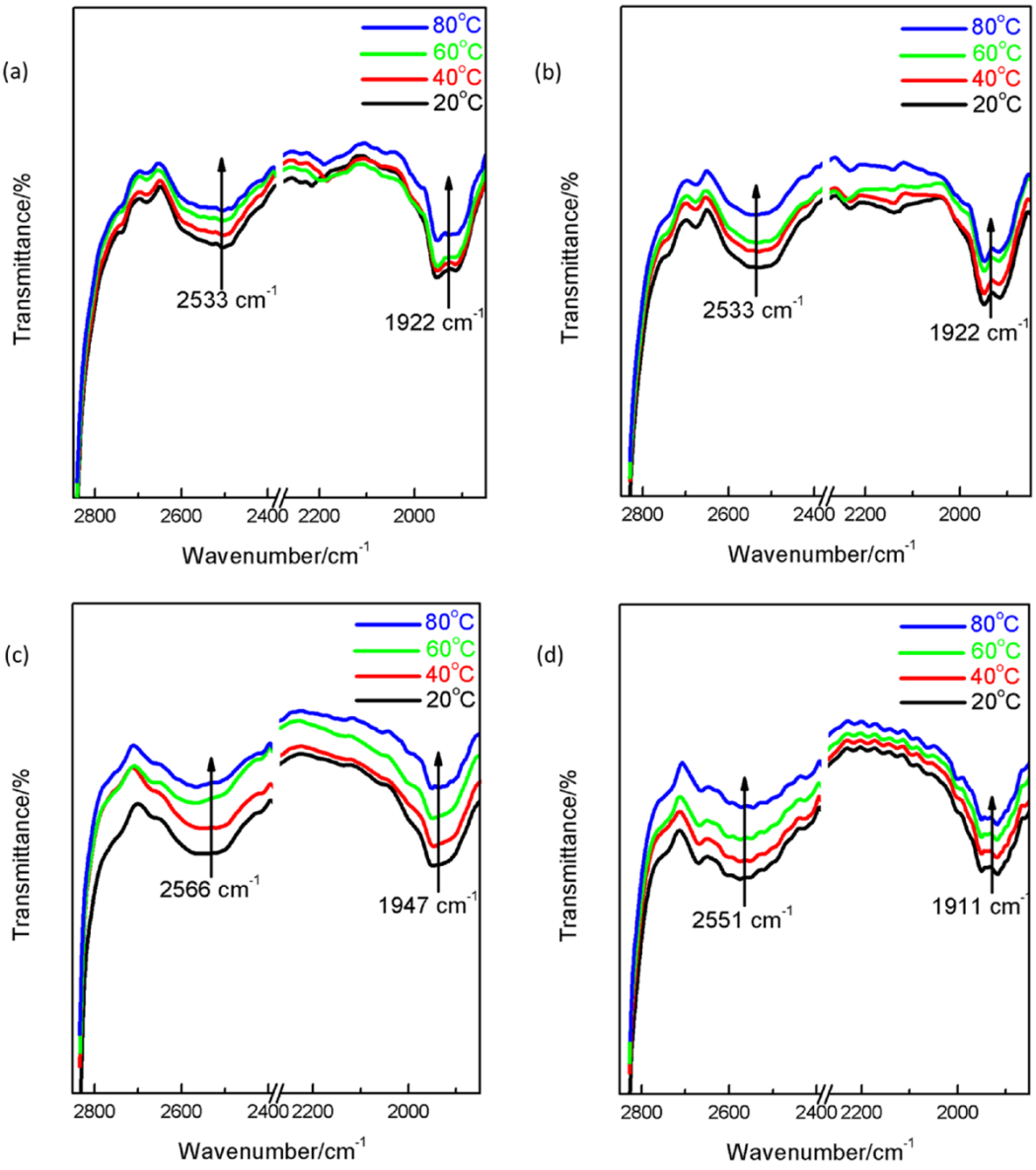

Fig. S1 Variable-temperature FT-IR spectra at the range from 20 to 80 °C of H-bonded chiral switches. (a): (R,S,R)-**a**; (b): (R,S,R)-**b**; (c): (R,S,R)-**c**; (d): (R,S,R)-**d**

Fig. S2 and Fig. S3 show the changes of the pitch length of four proton donors and the proton acceptor at various temperatures, respectively. The inset images in Fig. S2 and Fig. S3 are the POM images of the samples in Cano wedge cells. As shown in Fig. S2 and Fig. S3, it clearly shows that, the pitch lengths of the N*-LCs doped with the four proton donors and the proton acceptor increase with increasing temperature, which means that the HTPs of the four proton donors and the proton acceptor decrease. We think this may be due to the change of the dihedral angle of the binaphthyl groups in proton donors and proton acceptor.

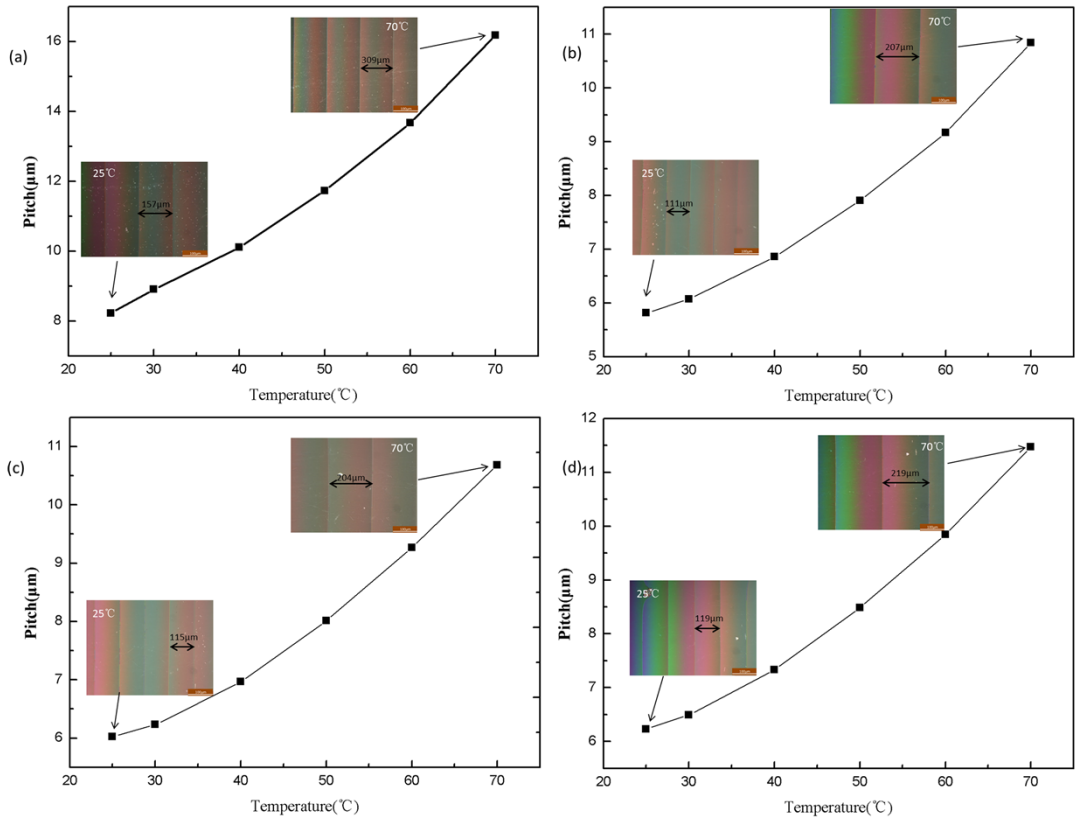

Fig. S2 Changes in the helical pitch (a): (R)-Proby (1.0 wt%), (b): (R)-Hexby (3.0 wt%), (c): (R)-Hepby (3.0 wt%), and (d): (R)-Otcby (3.0 wt%) in SLC1717 and POMs of Cano wedge cells at various temperatures.

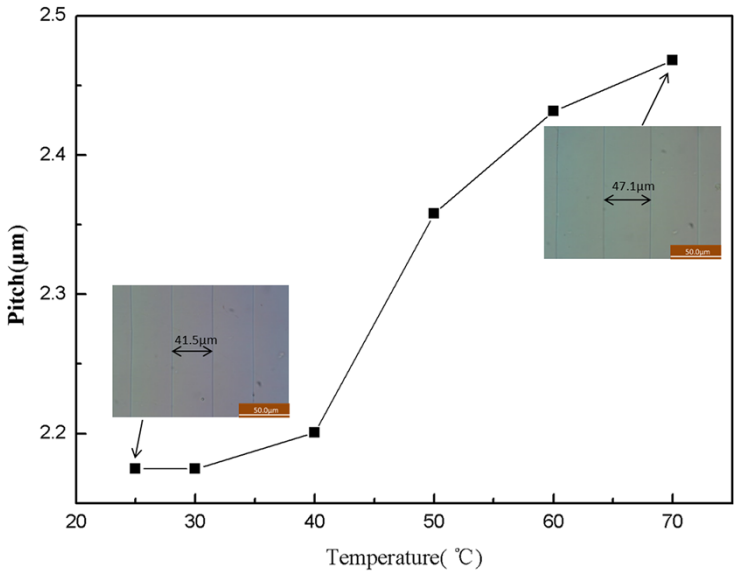

Fig. S3. Changes in the helical pitch of BNAzo (1.0 wt%) in SLC1717 and POMs of Cano wedge cells at various temperatures.

In order to get an understanding the H-bond interaction with temperature, we provide an direct comparison about the pitch length and HTPs between H-bonded chiral dopants and ruptured cases. Here, to obtain completely ruptured and separated samples {BNAzo+(R)-Proby, BNAzo+((R)-Hexby, BNAzo+(R)-Hepby, BNAzo+(R)-Otcby}, we add the proton acceptor (BNAzo) and the proton donors {(R)-Proby, (R)-Hexby, (R)-Hepby, (R)-Otcby} with molar ratio 1:2 into SLC1717 host without no H-bonded assembly process, in which the weight ratio are corresponding to BNAzo+(R)-Proby:SLC1717 host = 1:97 and the other mixtures: SLC1717=3:97 respectively. As shown in Fig. S4, the pitch lengths of N*-LCs with BNAzo+((R)-Hexby and BNAzo+(R)-Hepby are larger than that of N*-LCs doped with the corresponding H-bonded chiral dopants. While the pitch lengths of N*-LCs with BNAzo+(R)-Proby and BNAzo+(R)-Otcby are smaller than that of N*-LCs doped with the corresponding H-bonded chiral dopants. When we just consider the effects of H-bonded interaction in these four H-bonded chiral switches, the above results demonstrate that the HTPs of (R,S,R)-**a** and (R,S,R)-**d** become small, and the HTPs of (R,S,R)-**b** and (R,S,R)-**c** become large with temperature increasing.

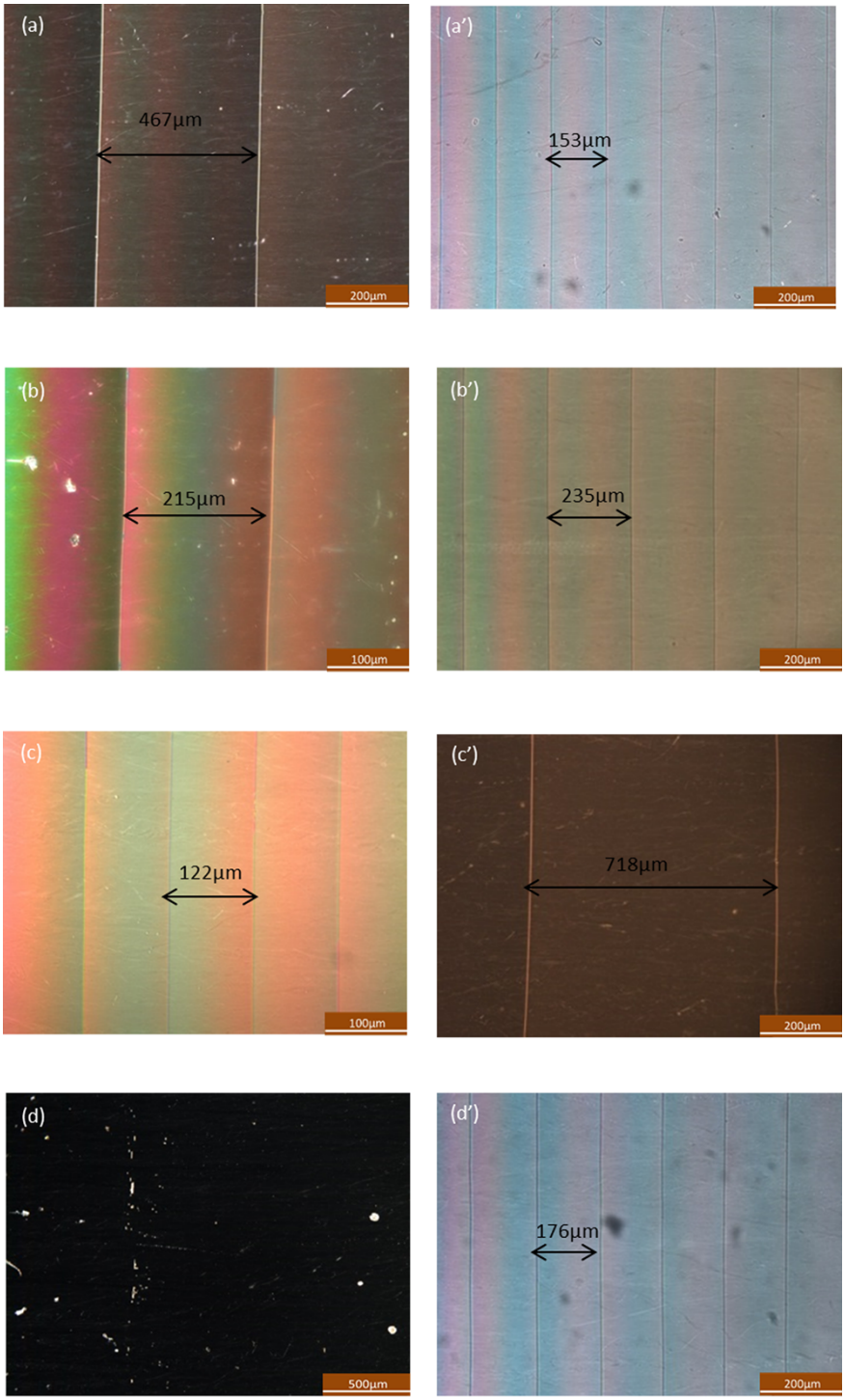

Fig. S4 POM images of the samples in Cano wedge cells at 25 °C, (left, the completely ruptured cases) (a) BNAzo+(R)-Proby (1.0 wt%), (b) BNAzo+(R)-Hexby (3.0 wt%), BNAzo+(R)-Hepby (3.0 wt%), BNAzo+(R)-Otcby (3.0 wt%); (right, the H-bonded dopants) (a'): (R,S,R)-**a** (1.0 wt%), (b'): (R,S,R)-**b** (3.0 wt%), (c'): (R,S,R)-**c** (3.0 wt%), and (d'): (R,S,R)-**d** (3.0 wt%) in SLC1717.