Supporting Information

Left- and right-circularly polarized light-sensing based on colored and mechano-responsive chiral nematic liquid crystals

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Physical measurements and materials

Physical measurements: Transmission and circular dichroism (CD) spectra were recorded with JASCO V-570 and J-720 spectrometers, respectively. Reflection spectra were measured using a spectrometer with a reflection probe (Flame-S, Ocean Optics, Japan). The CD spectra of liquid crystal materials doped with enantiomeric Ru(III) complexes were measured using a homogeneous alignment cell (RP type, EHC, Japan) or a glass slide with a cover glass (S1111, Matsunami Glass, Japan). Polarized optical microscope observation was performed with a CX-31 (Olympus, Japan) with transmitted and reflected light using a hot stage (Imoto Machinery, Japan).

Materials: 5CB and PPMB were purchased from TCI (Tokyo, Japan) and Aldrich (Tokyo, Japan), respectively and were used without further purification. **Rutrop-1** was synthesized and optically resolved into Δ, Λ isomers according to the procedure previously reported by us.[1] Chiral nematic liquid crystals were prepared by directly mixing **Rutrop-1** with nematic liquid crystals, followed by keeping the mixtures at an isotropic phase for the complete dissolution.

CD spectra

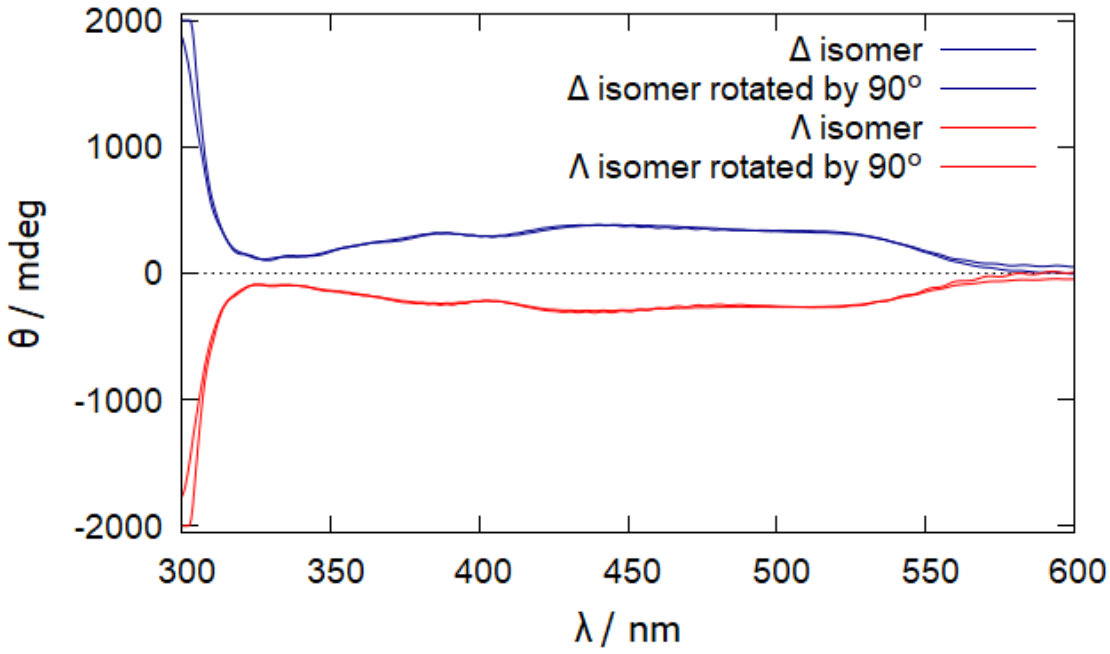

Figure S1 CD spectra of binary mixtures of **Rutrop-1** (ca. 0.04 mol%) and PPMB injected into a homogeneous alignment cell of 25 μm thickness. The measurements were done at two positions by rotating 90°.

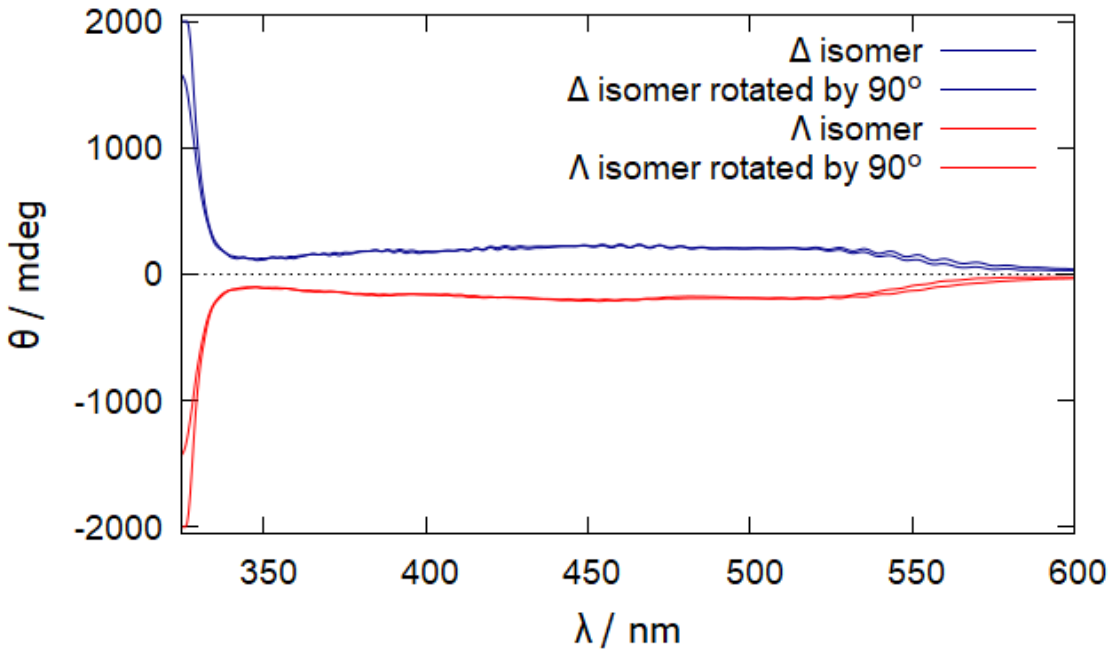

Figure S2 CD spectra of binary mixtures of **Rutrop-1** (ca. 0.04 mol%) and 5CB injected into a homogeneous alignment cell of 25 μm thickness. The measurements were done at two positions by rotating 90°.

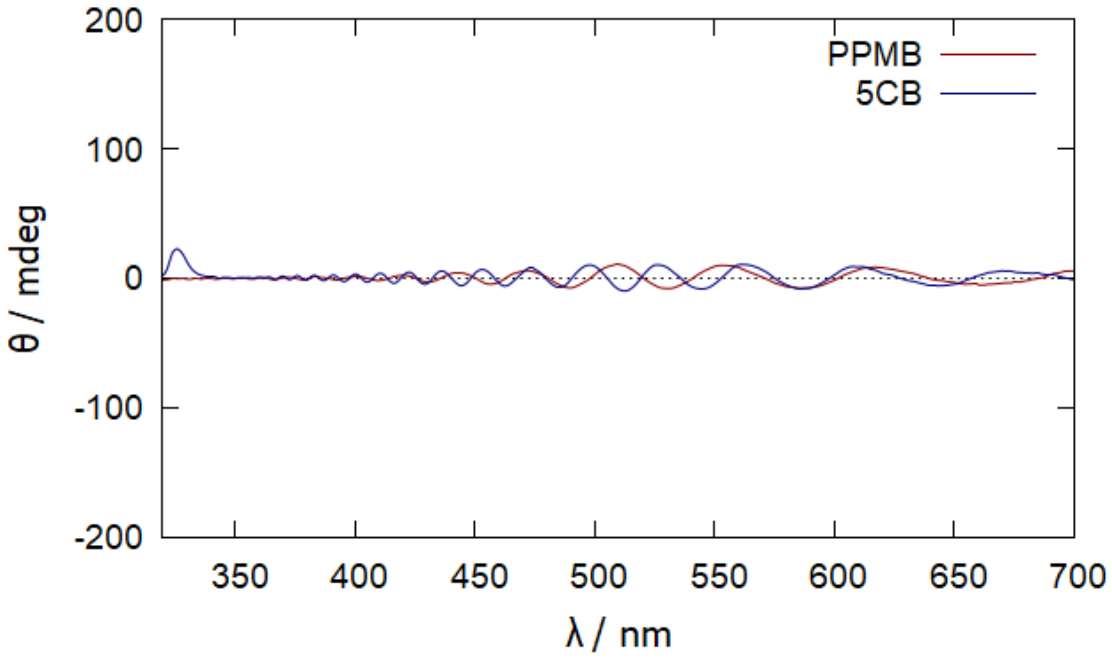

Figure S3 CD spectra of 5CB and PPMB each injected into a homogeneous alignment cell of 25 μm thickness.

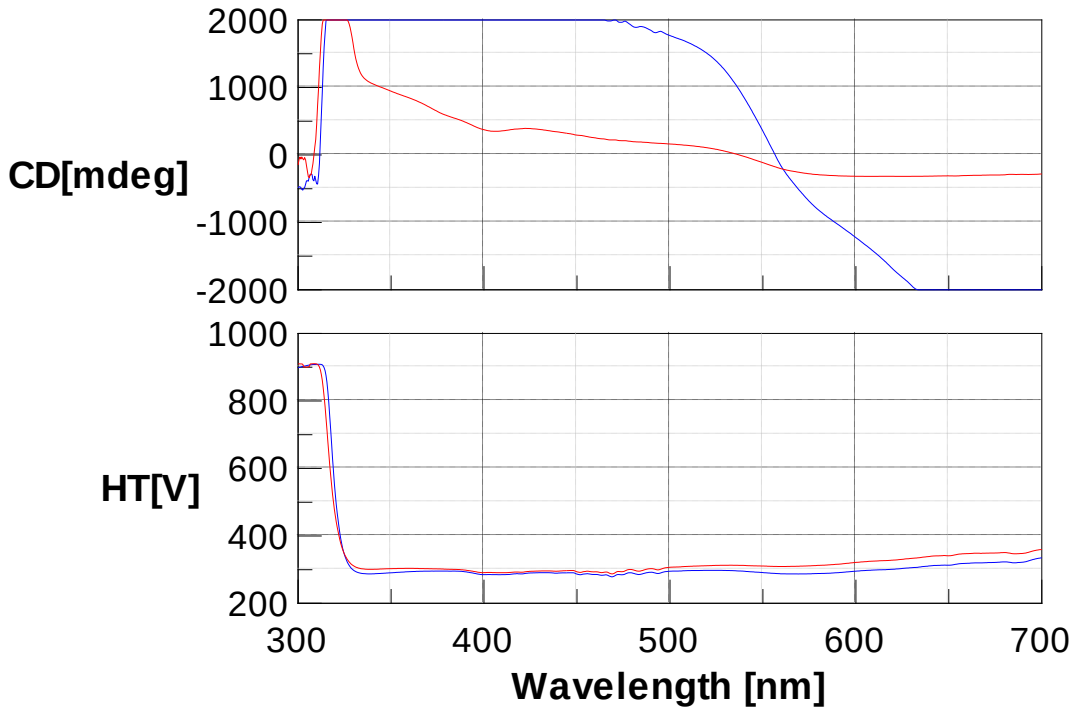

Figure S4 CD spectra of a binary mixture of Δ–**Rutrop-1** (1.4 mol%) and 5CB measured at focal conic (red line) and Grandjean states (blue line). HT (V) is the voltage applied to a photomultiplier tube. The sample was sandwiched between a glass slide and a cover glass.

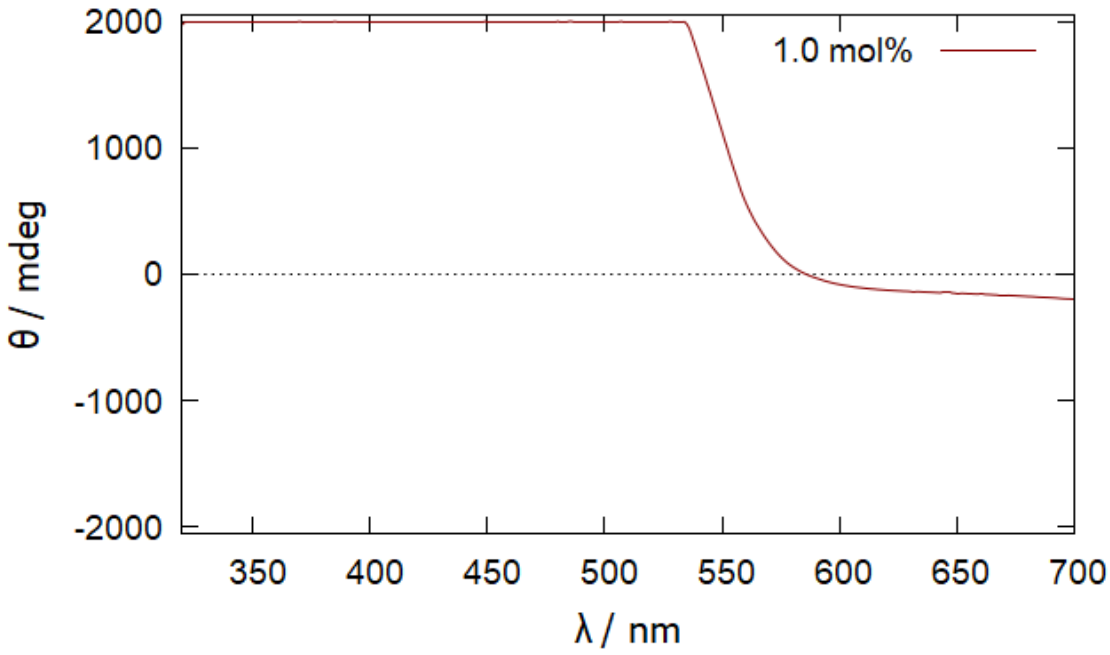

Figure S5 CD spectra of a binary mixture of Δ–**Rutrop-1** (1.0 mol%) and 5CB. The sample was sandwiched between quartz glass slides.

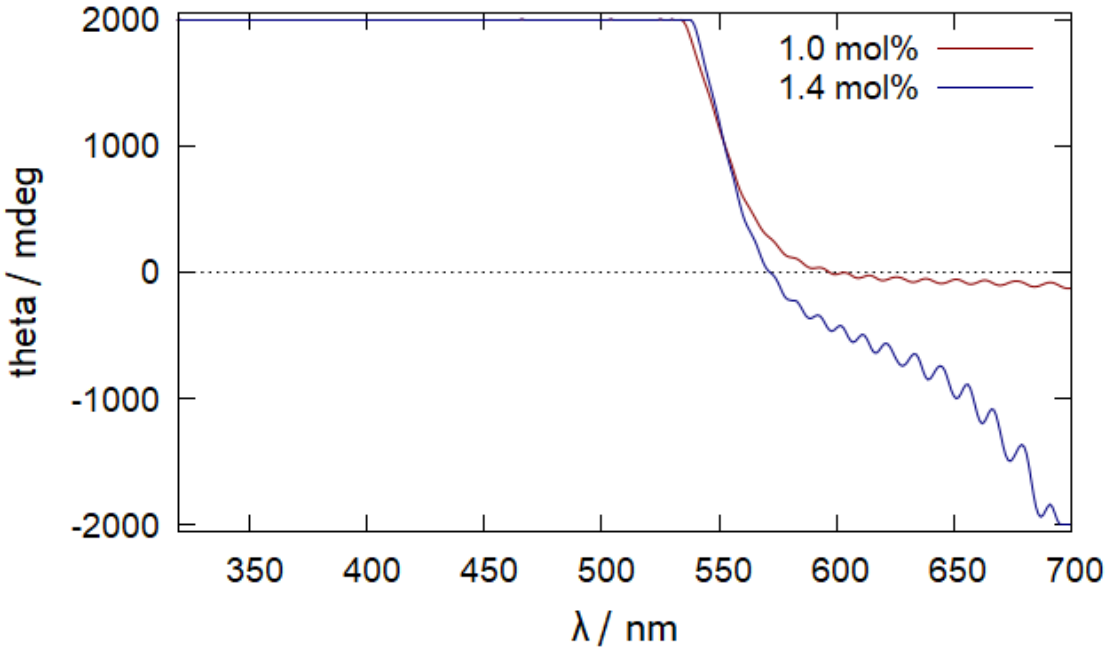

Figure S 6 CD spectra of a binary mixture of Δ–**Rutrop-1** (1.0 and 1.4 mol%) and 5CB. The samples were injected into a homogeneous alignment cell of 5 μm thickness.

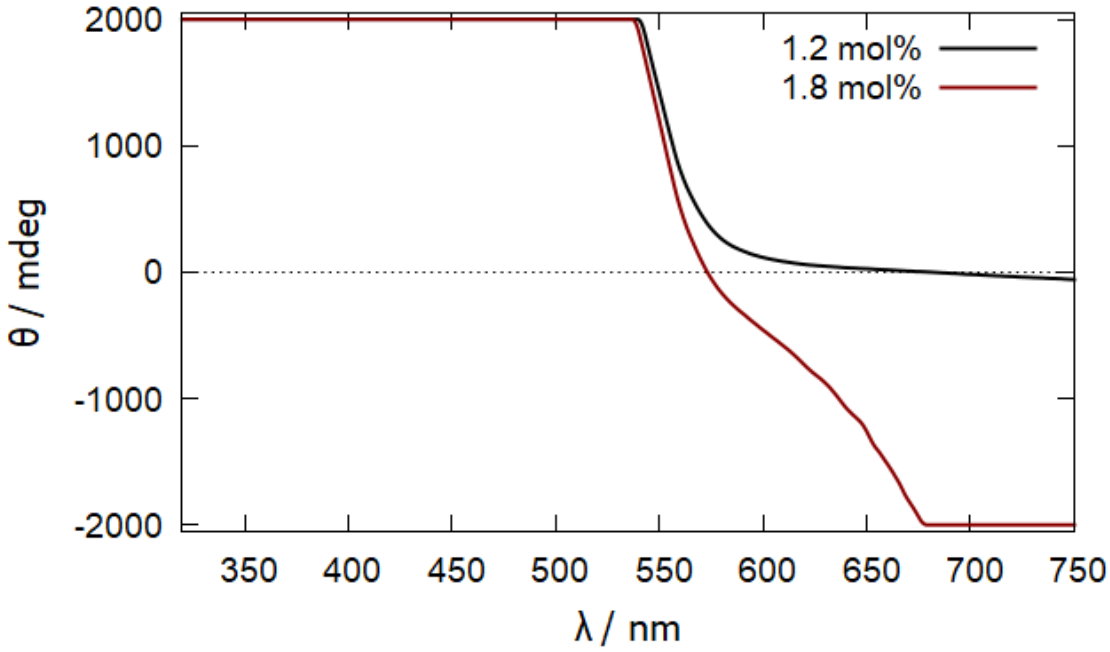

Figure S7 CD spectra of Δ-**Rutrop-1** (1.2 and 1.8 mol%) and PPMB. The samples were sandwiched between a glass slide and a cover glass (the Grandjean states).

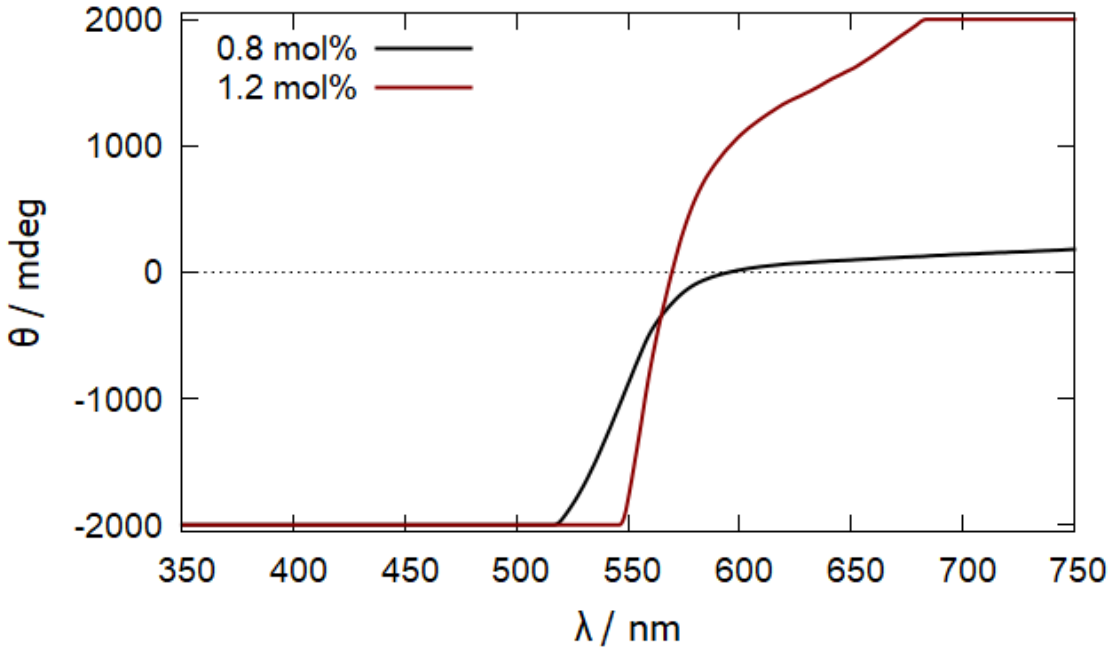

Figure S8 CD spectra of Λ-**Rutrop-1** (0.8 and 1.2 mol%) and 5CB. The samples were sandwiched between a glass slide and a cover glass (Grandjean states).

Transmission spectra

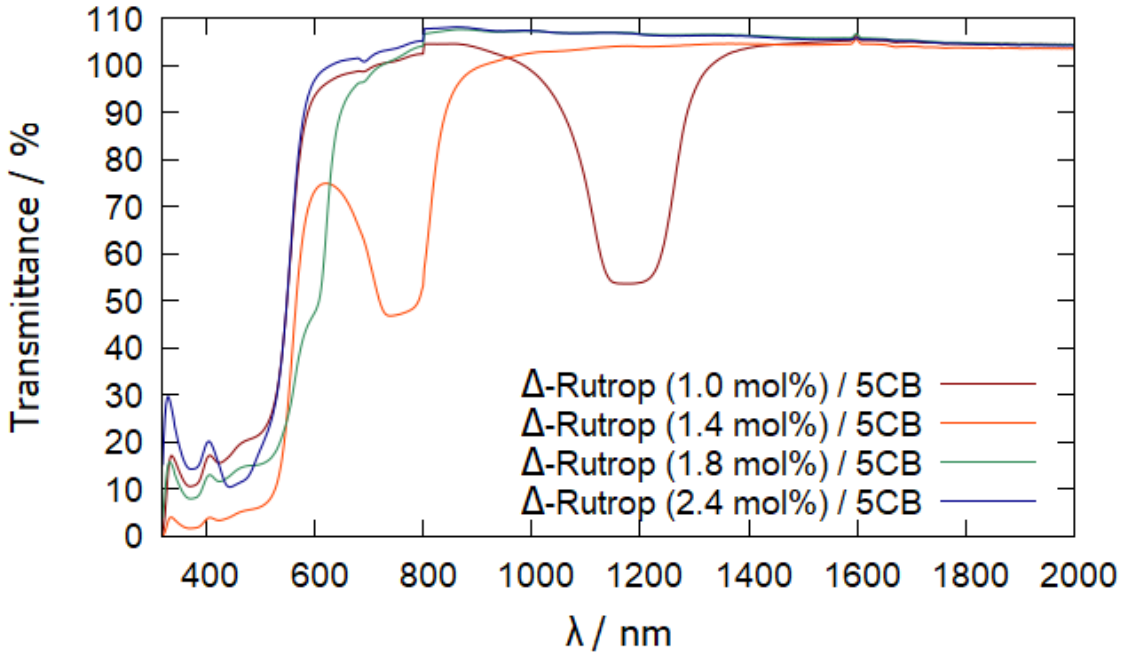

Figure S9 Transmission spectra of binary mixtures of Δ-**Rutrop-1** (1.0, 1.4, 1.8 and 2.4 mol%) and 5CB. The samples were sandwiched between a glass slide and a cover glass (Grandjean states).

Reflectance spectra

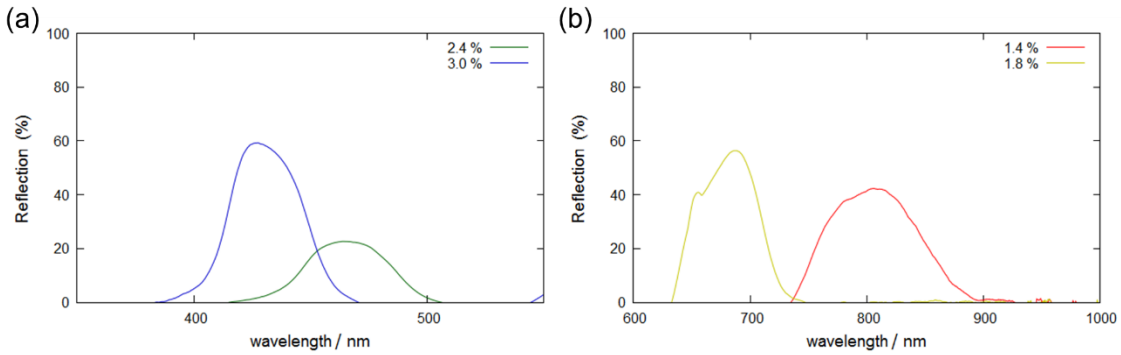

Figure S10 Reflection spectra of binary mixtures of Δ-**Rutrop-1** and 5CB in the Grandjean state; dopant concentrations are (a) 2.4 and 3.0 mol% and (b) 1.4 and 1.8 mol%. The samples were sandwiched between a glass slide and a cover glass.

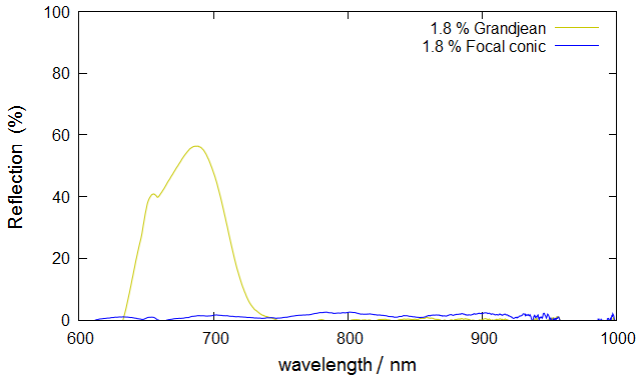

Figure S11 Reflection spectra of binary mixtures of Δ-**Rutrop-1** (1.8 mol%) and 5CB in the Grandjean and focal conic states. The sample was sandwiched between a glass slide and a cover glass.

Polarized optical microscope images

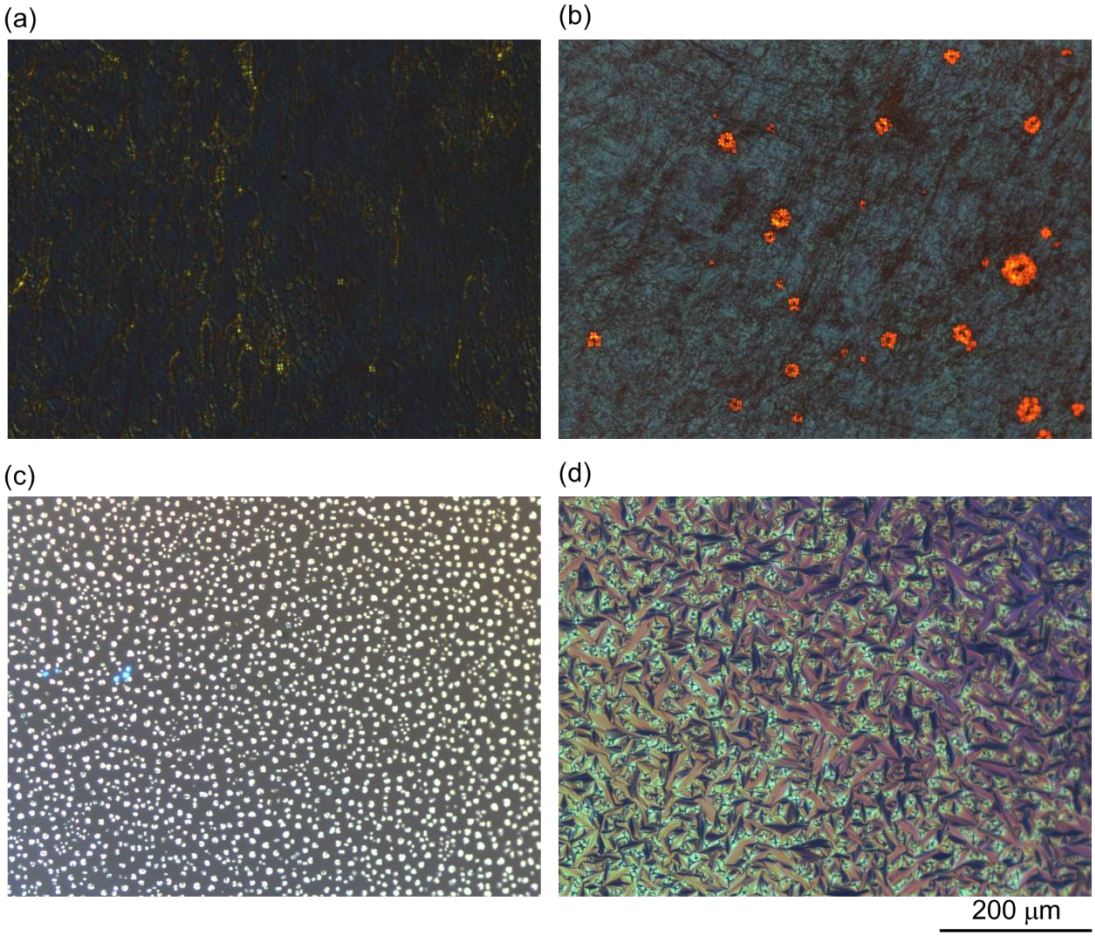

Figure S12 Polarized optical microscope images of the binary mixture of Δ–**Rutrop-1** (2.4 mol%) and 5CB taken in the course of heating from Grandjean state to the isotropic phase and cooling from the isotropic phase to the focal conic state: (a) Grandjean state, (b) transition from Grandjean to the focal conic state (orange domains), (c) transition from the isotropic phase to the focal conic state, and (d) the focal conic state.

Reference

(1) Yoshida, J.; Tamura, S.; Watanabe, G.; Kasahara, Y.; Hidetaka, Y. *Chem. Commun* **2017**, *53*, 5103–5106.