Supporting information

Reversibly tunable helicity induction and inversion in liquid crystal self-assembly by a planar chiroptic trigger molecule

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Experimental section

Instrumentation: UV-vis spectra were recorded on a JASCO V-570 spectrometer. CD spectra were recorded on a JASCO J-830 spectropolarimeter. High-performance liquid chromatography (HPLC) was carried out on PD-8020, TOSH with Chiral AD-H columns. Microscopic analyses were performed with an OLYMPUS IMT-2 equipped with a digital camera (CoolPix 995, NIKON) and a Mettler FP82HT hot stage. Photoisomerization was carried out with a super-high-pressure mercury lamp (500 W, USHIO inc.) through an appropriate filter (356 or 436 nm).

Materials: Nematic liquid crystal hosts ZLI-1132 and DON-103 were purchased from Merck while 5CB was obtained from TCI chemicals, Japan. Enantiomeric chiral agents, R-1011 (right-handed cholesterics) and S-1011 (left-handed cholesterics) with known cholesteric handedness induction abilities in the above nematic solvents were purchased from Merck. ZLI-1132 (TNI = 72.3 °C) is mixtures of 4-(4-alkylcyclohexyl)-benzonitrile and 4-(4-alkylcyclohexyl)-42-cyanobiphenyl derivatives while DON-103 (TNI = 74.2 °C) contains mixtures of cyclohexanoic acid phenylesters. 5CB (4-cyano-42-pentylbiphenyl) exhibits nematic to isotropic transition at 35.0 °C. All solvents, reagents and other chemicals were obtained from commercial sources and used without further purification.

Measurement of cholesteric pitch and handedness. The cholesteric liquid crystal was prepared by weighing appropriate amount of host liquid crystal and the dopant into a vial followed by mixing them with the addition of a few drops of dichloromethane. After evaporation of the solvent under reduced pressure, the mixture was loaded into the wedge cell by capillary action at room temperature. The pitch was then determined by measuring the intervals of Cano's lines appearing on the surfaces of wedge-type liquid crystalline cells (EHC, KCRK-07, $\tan\theta$ = 0.0194). The relationship between the distances of Cano's lines and the cholesteric pitch P is $P = 2R \tan \theta$, where R represents the distance between Cano's lines, and θ the angle between the cells.

Twisting sense of the helix was determined by a combination of contact method and color shift method. Under a polarizing microscope, besides the disclination lines, color stripes are also observed. From the direction in which these color stripes move upon rotation of the polarizer, the twisting sense of

the helix can be determined. If the colors are shifted towards the origin of the wedge upon turning the polarizer (located under the cell, top view) in clockwise direction, the helix is right-handed or (+). By convention, a right-handed twisting sense corresponds to a positive sign of the pitch and vice versa.

HPLC analysis

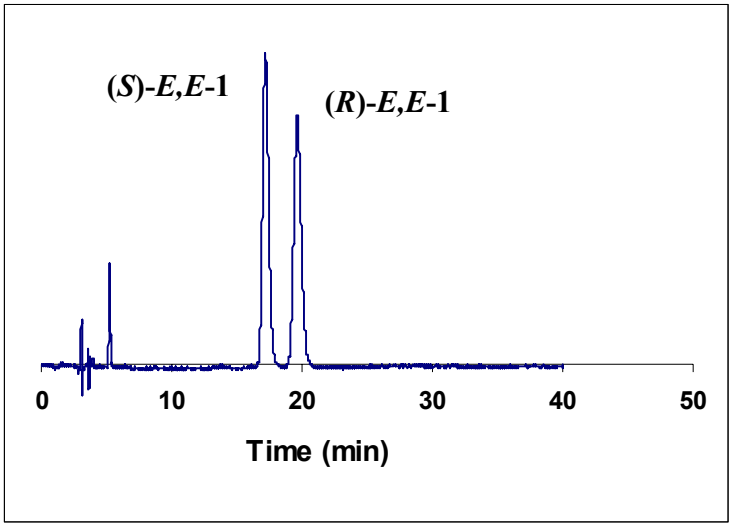

Figure S1. HPLC chart of racemic ***E,E*-1** before irradiation. Chiral column AD-H, IPA/Hexane= 20/80.

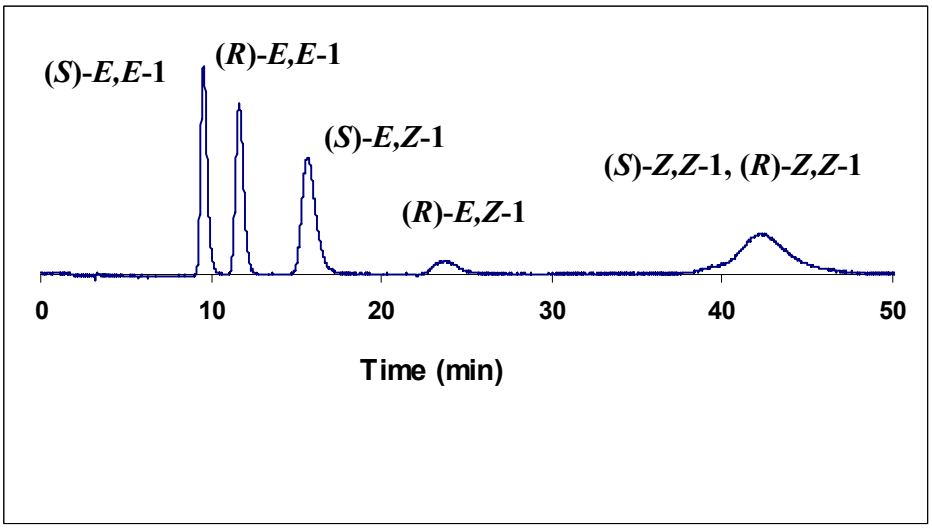

Figure S2. HPLC chart of the mixture of isomers after irradiation of racemic ***E,E*-1** at 436 nm. Chiral column AD-H, IPA/Hexane= 40/60.

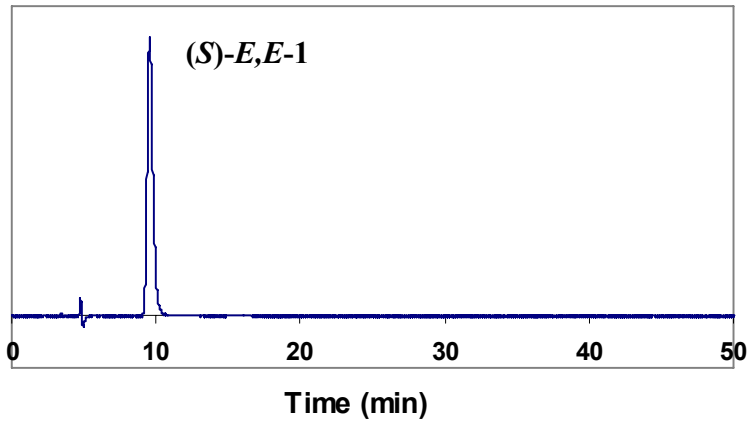

Figure S3. HPLC chart of enantio pure **(*S*)-*E*,*E*-1** isomer before irradiation. Chiral column AD-H, IPA/Hexane= 40/60.

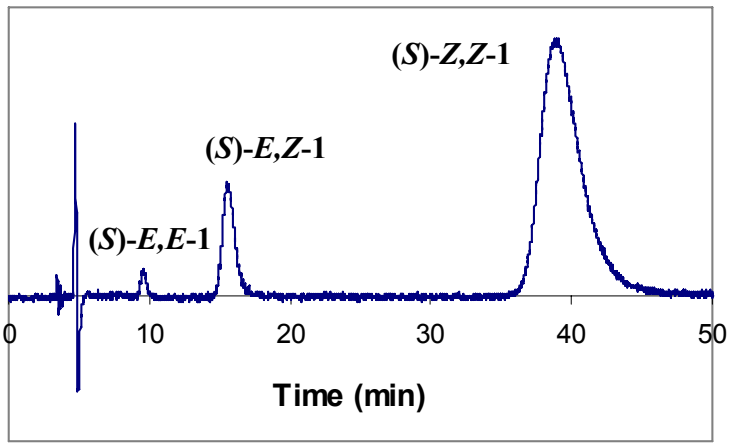

Figure S4. HPLC chart of the mixture of isomers after irradiation of enantio pure **(*S*)-*E*,*E*-1** isomer at 366 nm for 3 min. Chiral column AD-H, IPA/Hexane= 40/60.

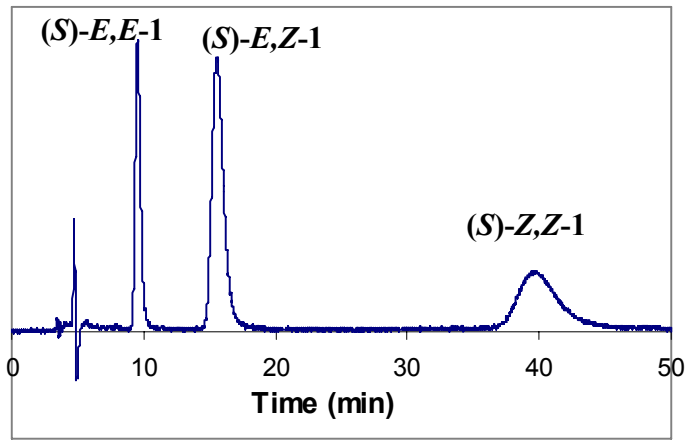

Figure S5. HPLC chart of the mixture of isomers after irradiation of enantio pure **(*S*)-*E*,*E*-1** isomer at 366 nm for 3 min followed by 436 nm irradiation for 5 min. Chiral column AD-H, IPA/Hexane= 40/60.