

Electronic Supplementary Information

The formation of a chiral supramolecular structure acting as a template for chirality transfer

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Fig. S1 Spectra recorded on a CD instrument for the PS-DC materials with opposite handedness. Blue shows a spectrum of the PS-DC material with a positive optical rotation. Red shows that with a negative optical rotation. The sample was put between quart boards. The sample thickness was not adjusted. Therefore, there is difference in CD magnitude between the samples.

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Fig. S3 Schematic illustration of the preparation process of the photo-polymerized film.

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Experimental

1.1 Materials

Preparation and characterization of trimer **I** were reported in our earlier paper.²⁸ Benzyl methacrylate and 1,1,1-tris(acryloyloxymethyl)propane were purchased from Tokyo Chemical Industry Co., Ltd. 1,4-Bis[4-(3-acryloyloxypropoxy)benzoyloxy]-2-methylbenzene (RM257), 2-methyl-1-[4-(methylthio)phenyl]-2-morpholinopropan-1-one, and 4-methoxyphenol were provided from DIC corporation.

1.2 Polymer-stabilized DC phase

We prepared a mixture of trimer **I** (70.6 wt%), liquid-crystalline bifunctional reactive monomer RM257 (23.3 wt%), 2-methyl-1-[4-(methylthio)phenyl]-2-morpholinopropan-1-one (5.0 wt%) and 4-methoxyphenol (1.1 wt%). The mixture on a glass plate was heated to the isotropic liquid at 155 °C and then it was spread for a suitable size (8 mm x 15 mm) using a spatula. Then it was cooled to the DC phase. The mixture was irradiated with 365 nm UV light at a power density of 10 mW cm⁻² for 80 sec at 125 °C. It was again heated to the isotropic liquid at 200 °C and then cooled to the DC phase at 25 °C at a cooling rate of 5 °C min⁻¹.

1.3 Polymerization of achiral monomers on the surface of the PS-DC material

A typical procedure is described here. The PS-DC material with homochirality (2.6 mg) was put on a glass plate. Then a sandwich cell was constructed. The cell gap was maintained at 200 µm using spacers. We prepared a mixture of benzyl methacrylate (47.5 wt%), 1,1,1-tris(acryloyloxymethyl)propane (47.5 wt%) and 2-methyl-1-[4-(methylthio)phenyl]-2-morpholinopropan-1-one (5.0 wt%). The mixture (22.4 mg) was put on the PS-DC material with a positive optical rotation. The sample within a sandwich cell was exposed to 365 nm UV light at a power density of 10 mW cm⁻² for 60 sec. After polymerization, the cell was immersed in chloroform (20 ml) under ultrasonic irradiation at a frequency of 40 kHz to isolate the polymer film from the PS-DC material. The isolated polymer was dried in air to give a transparent film (11.8 mg).

1.4 Elementary analysis

Table S1 Elementary analysis of polymer films prepared from the PS-DC material with a positive optical rotation.

Polymer film ^a	C (%)	H (%)
1 A	64.98	6.683
B	64.73	6.715
2 A	64.34	6.593
B	64.79	6.741
3 A	66.83	6.755
B	66.86	7.098

^aWe prepared three films independently. Two portions obtained from each film were used for the elementary analysis.

Table S2 Elementary analysis of polymer films prepared from the PS-DC material with a negative optical rotation.

Polymer film ^a	C (%)	H (%)
1 A	66.21	6.973
B	65.83	6.820
2 A	66.17	6.863
B	66.23	7.100
3 A	66.53	6.740
B	66.40	7.001

^aWe prepared three films independently. Two portions obtained from each film were used for the elementary analysis.

2. Measurements

Optical textures were observed using a polarizing optical microscope (POM, BX-51; Olympus Optical Co. Ltd.) equipped with a temperature control unit (LK-600PM; Japan High Tech Co. Ltd.). Field-emission scanning electron micrographs were obtained using a JSM-7000 FE-SEM (JEOL) with accelerating voltages of 10 keV. The sample was coated with platinum before being analyzed. Circular dichroism (CD) and UV-vis spectra were obtained using a J-1100DS (JASCO). Elementary analysis was performed using an EA1110 (CE Instruments Ltd.).

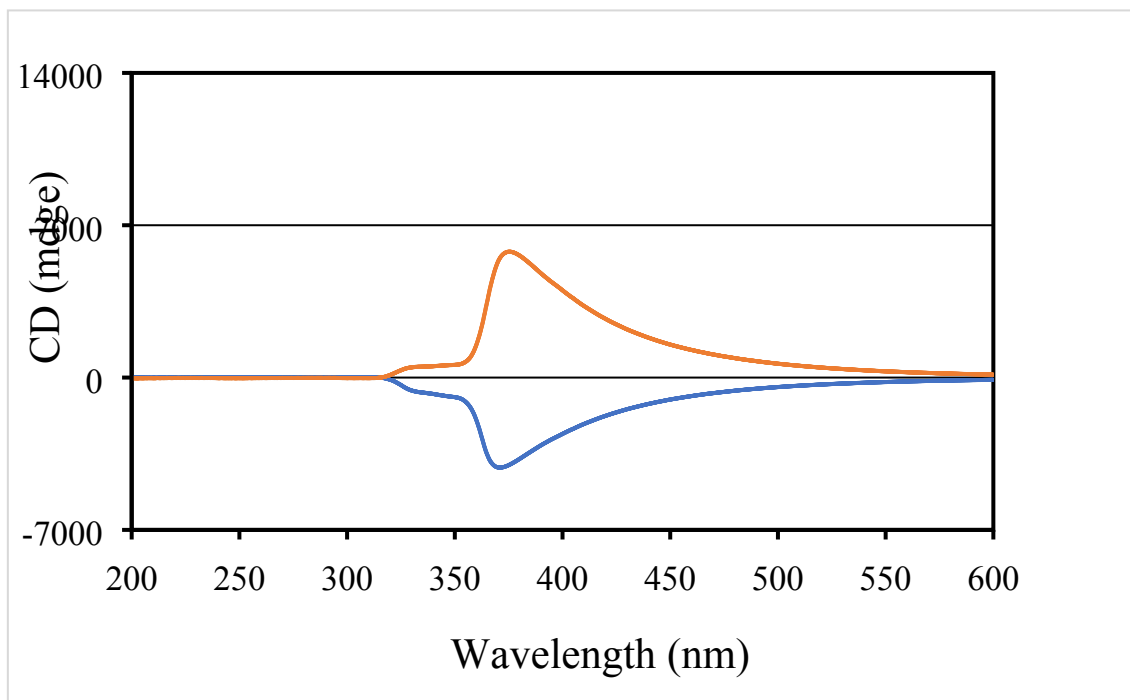


Fig. S1 Spectra recorded on a CD instrument for the PS-DC materials with opposite handedness. Blue shows a spectrum of the PS-DC material with a positive optical rotation. Red shows that with a negative optical rotation. The sample was put between quart boards. The sample thickness was not adjusted. Therefore, there is difference in CD magnitude between the samples.

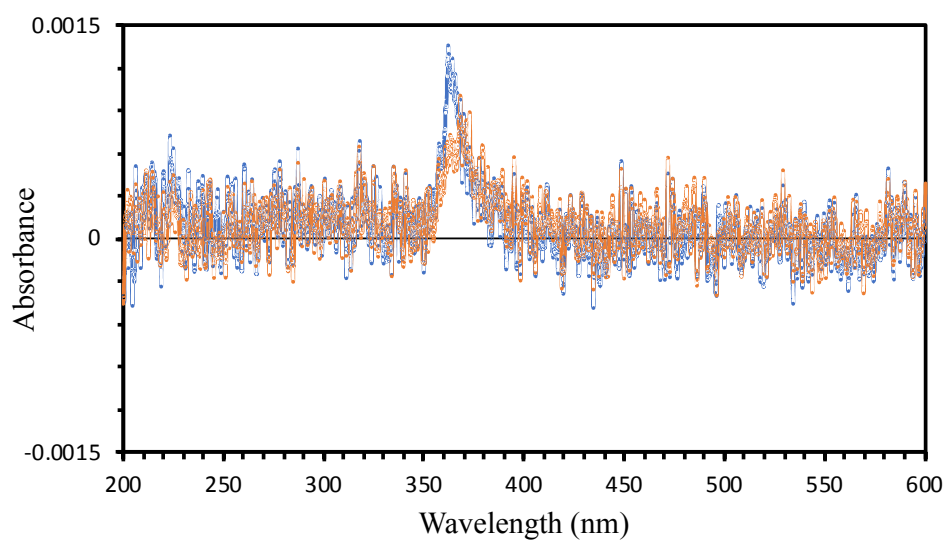


Fig. S2 UV-vis spectra of the PS-DC materials with opposite handedness. Blue shows a spectrum of the PS-DC material with a positive optical rotation. Red shows that with a negative optical rotation.

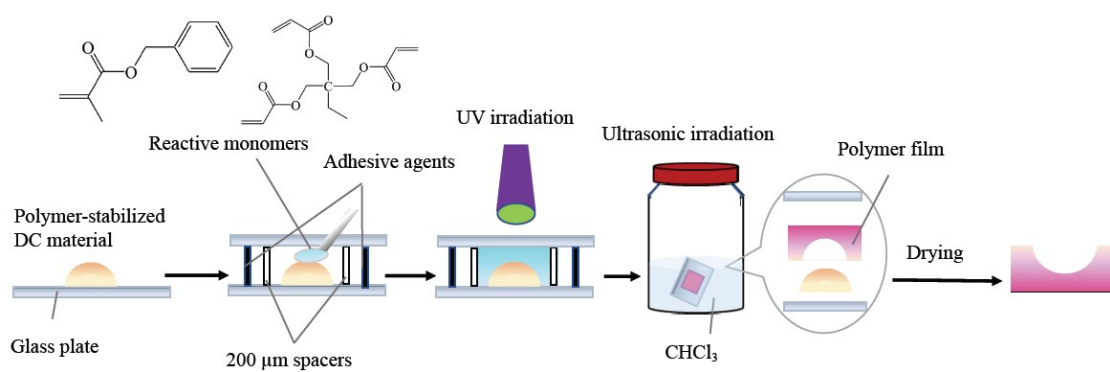


Fig. S3 Schematic illustration of the preparation process of the photo-polymerized film.

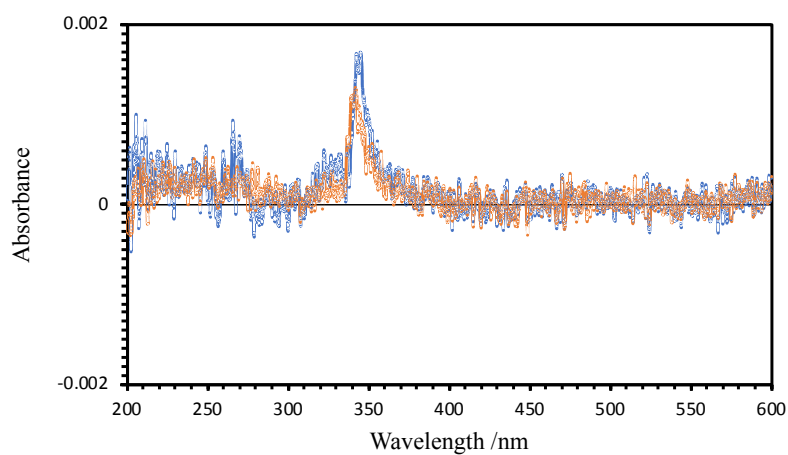


Fig. S4 UV-vis spectra of the polymer films prepared by using each PS-DC material possessing opposite twist senses. Blue shows a spectrum of the polymer film prepared on the PS-DC material with a positive optical rotation. Red shows that prepared on the PS-DC material with a negative optical rotation.