

Supporting Information

Enantioselective Synthesis of Helical Polydiacetylene in the Visible Light Region

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A. Materials

PCDA 10,12-Pentacosadiynoic acid (PCDA) was purchased from Tokyo Chemical Industry Co., Ltd., and purified by dissolving in cyclopentanone and filtrating to remove the polymer before use. Pure PCDA films and the hybrid DA films with 3.4 mol% $[\text{Ru}(\text{dpphen})_3]\text{Cl}_2$ were prepared by spin-coating method.

Instrumentation

The enantio-selective polymerization reactions were carried out using the apparatus shown in Figure S1a. The CPVL (generated by 532nm ND:YAG CW Semiconductor laser) was applied simultaneously with unpolarized UV light (16W UV lamp, $\lambda = 254 \text{ nm}$) to realize the enantio-selective polymerization. The light intensity of CPVL and UV light were about 30 mW cm^{-2} and 15 mW cm^{-2} , respectively.

The UV-vis absorbance spectra were measured by put the PCDA film perpendicular to the light path using SHIMADZU UV-2550 PC spectrometer. The CD spectra were measured by put the PCDA film perpendicular to the light path using JASCO CD spectrometer J-810. The films were simultaneously rotated around the light to eliminate the possible effect of birefringence and linear dichroism.

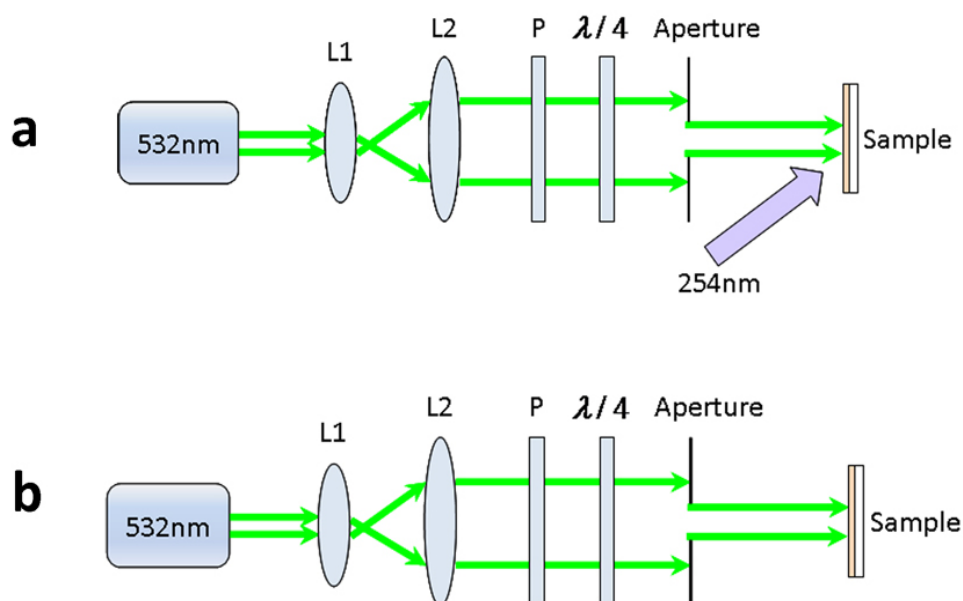


Fig. S1. The light path of (a) the CPVL with unpolarized UV light simultaneously; and (b) CPVL alone.

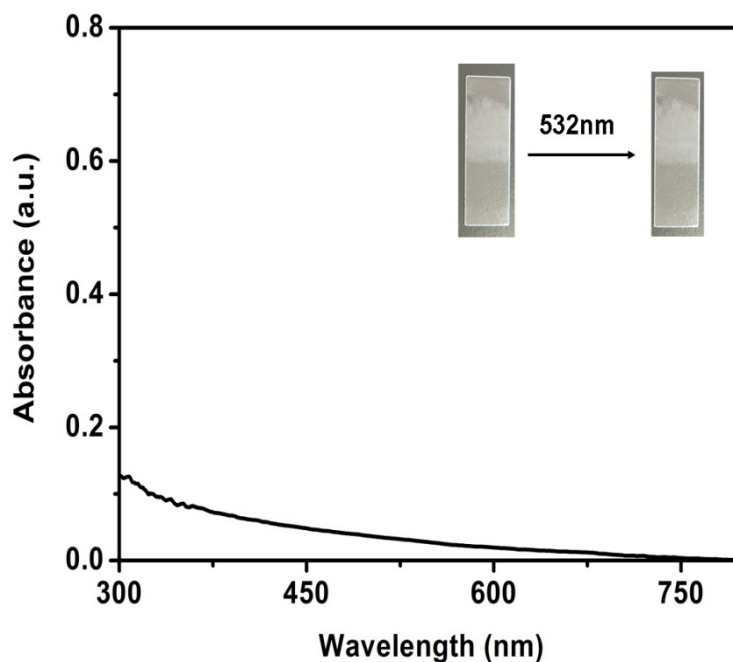


Fig. S2. The UV-vis absorption spectra of pure PCDA films after irradiation with CPVL (532nm) alone for 20 min.

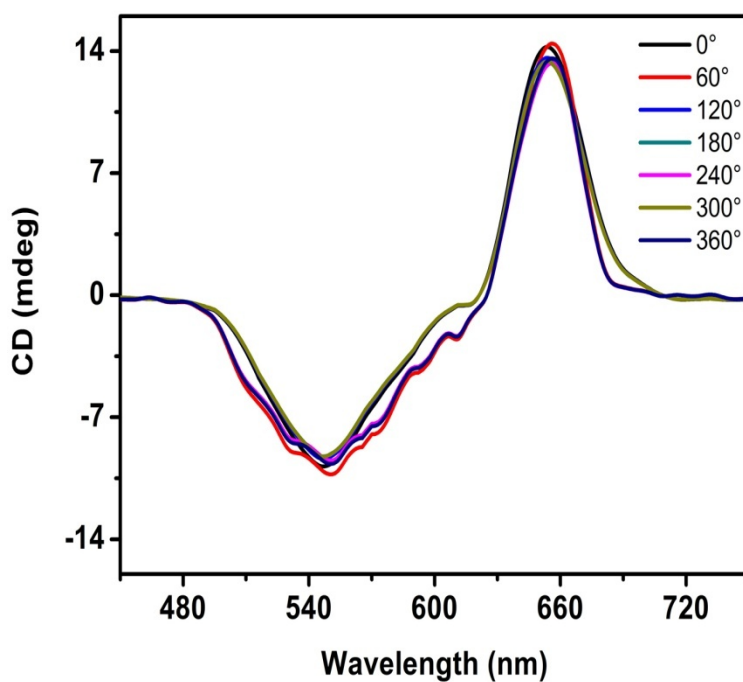


Fig. S3. The CD spectra of the PCDA film that upon irradiation with CPVL and unpolarized UV light at seven different angles (0, 60, 120, 180, 240, 300, 360).

In anisotropic systems, linear dichroism (LD) and birefringence often give erroneous CD signals. To convince the origin of chirality in CD spectral, rotation of the PCDA film is effective. Figure S3 shows the CD spectra for various rotation angles of PCDA film after irradiation

with CPVL and unpolarized UV light. Negligible change of CD intensity depending on the PCDA film rotation angle suggests chirality origin of CD spectra. Upon evaluating the CD signals by rotation at different angles, we demonstrated that the contribution from LD could be neglected for our samples.

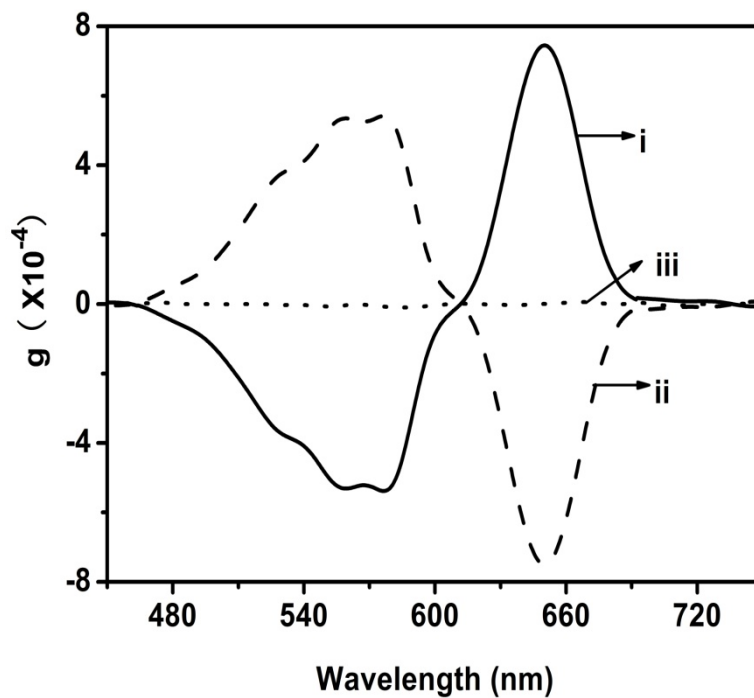


Fig. S4. The g-factor value of PCDA film upon irradiation with (i) right-handed CPVL and unpolarized UV light, (ii) left-handed CPVL and unpolarized UV light and (iii) unpolarized UV light alone, respectively.

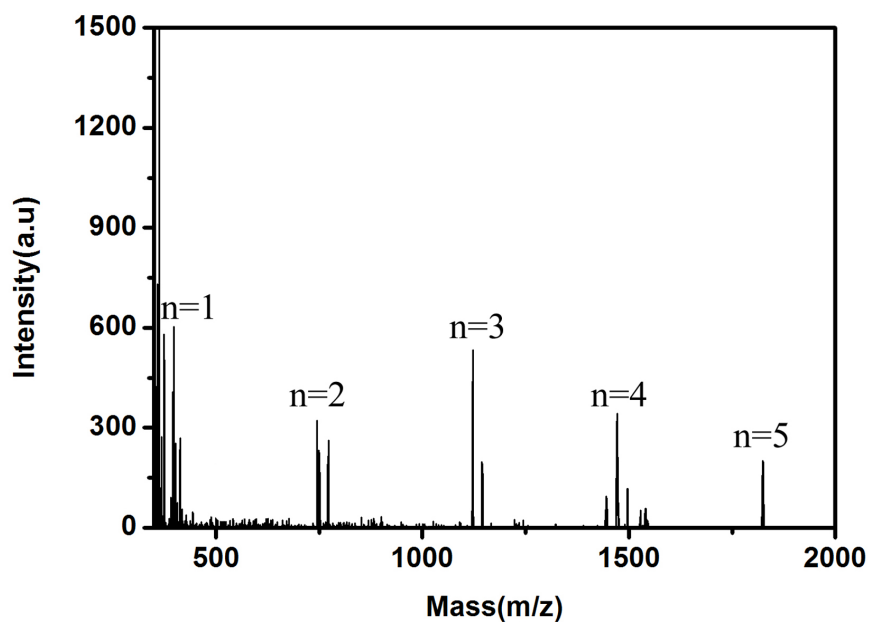


Fig. S5. MALDI-TOF mass spectra of PCDA oligomers (n=1,2,3,4,5).