Supporting Information

Circular Polarized Luminescence based Chirality Transfer of Chiral BINOL

Moiety via Rigid π -Conjugation Chain Backbone Structures

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1. Synthesis of monomers



Scheme S1 Synthesis of monomers M1 - M4

Synthesis of 3

A flask containing compound **1** (5.00 g, 15 mmol), paraformaldehyde (5.75 g, 190 mmol), potassium bromide (8.40 g, 70 mmol), and glacial acetic acid (80 mL) was placed in an ice bath. Then sulfuric acid (8.0 mL) and isochoric glacial acetic acid (1:4, v/v) were carefully dropped into this flask in more than 15 minutes, and the mixture was stirred overnight at 75 °C. After stirring, the mixture was cooled down to room temperature, filtered off, and the residue was washed with water until the sour smell disappeared and recrystallized from hexane to obtained compound **3** as a white crystal with 81% yield. mp: 82–83 °C. ¹H-NMR (400 MHz, CDCl₃, ppm): 7.01 (s, 2H), 4.61 (s, 4H), 4.06 (t, J = 6.4 Hz, 4H), 1.86 (m, 4H), 1.55 (m, 4H), 1.36–1.32 (m, 16H), 0.96 (t, J = 7.4 Hz, 6H).

Synthesis of M2

A mixture of compound **3** (2.6 g, 5 mmol), triphenyl phosphine (3.93 g, 15 mmol), and 50 mL of toluene was heated to 120 °C, and the reaction proceeded under the temperature while stirring for 24 h. The resulting mixture was filtered and washed with toluene. A mixture of the white solid above (1.93 g, 1.85 mmol), 27 mL of methylene chloride, and 7.2 mL of formalin solution (40%) was added, and then 20 mL of 20% sodium hydroxide aqueous was slowly dropped into the flask at 0 °C for over 20 min. The reaction was kept at room temperature for 24 h. Pouring the reaction mixture into 100 mL of water and then the mixture was extracted by dichloromethane, the organic layer was combined, and the solvent was removed through rotary evaporator. The crude product was further purified by silica gel column chromatography in 88% Yield. Mp: 42-43 °C.¹H-NMR (400 MHz, CDCl₃, ppm): δ 7.16-6.87 (m, 4H), 5.73 (dd, *J* = 17.8, 1.4 Hz, 2H), 5.25 (dd, *J* = 11.1, 1.3 Hz, 2H), 3.96 (t, *J* = 6.5 Hz, 4H), 2.03-1.66 (m, 4H), 1.62-1.18 (m, 20H), 0.89 (m, 6H).

Synthesis of (*R*/*S*)-4

2,2'-bis(methoxymethoxy)-1,1'-binaphthalene (4.28g, 11.4 mmol) was dissolved in 100 mL of anhydrous Et₂O, 16 mL of *n*-BuLi (2.5 mol/L in hexane, 40 mmol) was added by syringe injection at room temperature under N₂ atmosphere. The solution was stirred for 2h at room temperature, and then the solution of iodine (12 g, 44.7 mmol in 40 mL of anhydrous THF) was slowly injected to the mixed solution at 0 °C under N₂ atmosphere. The mixture was then stirred overnight while the temperature was gradually warmed to room temperature. The reaction was quenched by NaHSO₃

saturated solution. After removal of the solvent under reduced pressure, the residue was extracted with ether (2 × 50 mL), the combined organic layers were washed with water. The residues were purified by silica gel column chromatography, yielding light yellow powder in 44% yield. ¹H NMR (400 MHz, CDCl₃): 8.54 (s, 2H), 7.78 (d, J = 8.4 Hz, 2H), 7.45-7.16 (m, 6H), 4.81 (d, J = 5.7 Hz, 2H), 4.70 (d, J = 5.7 Hz, 2H,), 2.60 (s, 6H).

Synthesis of (R/S)-M4

Ethylbromide (12 ml, 155 mmol) was added to a solution of **4** (3.0 g, 5.6 mmol) and K_2CO_3 (5.0 g, 36 mmol) in acetonitrile (60 ml). After stirring the solution at reflux for 3 h, the reaction mixture was poured into H₂O (300 ml) and extracted with CH₂Cl₂ (2 × 100 ml). The combined organic layers were dried over MgSO₄ and the solvent was removed under reduced pressure. The product was purified by recrystallization from hexane to give compound **M4** as light yellow crystals in 91% yield. ¹H NMR (400 MHz, CDCl₃) δ 8.52 (s, 2H), 7.78 (d, *J* = 8.2 Hz, 2H), 7.45-7.32 (m, 2H), 7.29-7.21 (m, 2H), 7.08 (d, *J* = 8.5 Hz, 2H), 3.87-3.76 (m, 2H), 3.45-3.33 (m, 2H), 0.91 (t, *J* = 7.0 Hz, 6H).

2. UV-vis and FL spectra of 2,2'-diethoxy-1,1'-binaphthalene



Fig. S1 UV-vis spectrum (black solid line) and FL spectrum (blue solid line, $\lambda_{ex} = 313$ nm) of (*R*)-2,2'-diethoxy-1,1'-binaphthalene

3. CD spectrum of 2,2'-diethoxy-1,1'-binaphthalene



Fig. S2 CD spectra of (R)-2,2'-diethoxy-1,1'-binaphthalene

4. CPL spectrum of P1



Fig. S3 CPL spectrum of P1

5. Thermogravimetric analyses(TGA)



Fig. S4 TGA curve of chiral polymers P1 - P3

6. NMR spectra of monomers and polymers











Fig. S8 ¹H NMR spectrum of P2



Fig. S9 ¹H NMR spectrum of P3

7. Details of calculation at the TD-B3LYP/6-31G(d) level by Gaussian 09

Table S1. Comparison of the absorption properties and the ECD parameters of the optimized S_0 structures (C1, C2 and C3) calculated at the TD-B3LYP/6-31G(d) level with those from experimental results.

System	C1 a	C2 ^a	C3 ^a
E _x (nm)	344 (333)	442 (427)	426 (397)
Oscillator strength	0.19	2.07	2.03
Assignment (HOMO→LUMO)	74%	100%	100%
E _{HOMO} (eV)	-5.13	-4.78	-4.96
E _{LUMO} (eV)	-1.01	-1.69	-1.74
Gap (eV) ^b	4.13	3.10	3.22
$DS(10^{-40} \text{ cgs})$	142702	1675870	1666444
$RS(10^{-40} \text{ cgs})$	18.16	273.45	227.78
g_x (10-4 cgs)	5.09 (9.7)	6.53 (11.0)	5.47 (11.0)

^aThe experiment values are shown in the parentheses.

 $^{b}Gap = E_{LUMO} - E_{HOMO}$.

Table S2. Comparison of the emission properties and the CPL parameters of the optimized S_1 structures (C1, C2 and C3 clusters) calculated at the TD-B3LYP/6-31G(d) level with those from experimental results.

System	C1 a	C2 ^a	C3 ^a
E _x (nm)	433 (397)	516 (483)	477 (448)
Oscillator strength	0.11	2.07	2.03
Assignment (HOMO→LUMO)	100%	100%	100%
E _{HOMO} (eV)	-4.64	-4.51	-4.76
E _{LUMO} (eV)	-1.28	-1.95	-1.93
Gap (eV) ^b	3.36	2.56	2.83
$DS (10^{-40}\mathrm{cgs})$	99422	2275229	2064009
$RS(10^{-40} \text{ cgs})$	22.50	276.47	160.27
g_x (10 ⁻⁴ cgs)	9.05 (-)	4.86 (7.0)	3.11 (7.4)

^aThe experiment values are shown in the parentheses.

 $^{b}Gap = E_{LUMO} - E_{HOMO}$.