Supporting Information

Self-assembly of Isomeric Naphthalene Appended Glucono: Nanofiber, Nanotwist and circularly polarized luminescence

Zongwen Liu, [ab] Yuqian Jiang, [b] Jian Jiang,[*b] Donghua Zhai,[ab] Decai Wang[*a] and Minghua Liu[*bc]

[a]College of Biotechnology and Pharmaceutical Engineering, Nanjing Tech University, Nanjing 211816, Jiangsu, P. R. China.

[b]CAS Key Laboratory of Nanosystem and Hierarchical Fabrication, CAS Center for Excellence in Nanoscience, Nanophotonics Research Division, National Center for Nanoscience and Technology (NCNST) No.11 ZhongGuanCun BeiYiTiao, 100190 Beijing, P.R. China.

[c]Beijing National Laboratory for Molecular Science, CAS Key Laboratory of Colloid, Interface and Chemical Thermodynamics, Institute of Chemistry, Chinese Academy of Sciences, No.2 ZhongGuanCun BeiYiJie, 100190, Beijing P. R. China.

Table of Contents

S1. Supplementary Methods.....3

S2. Supplementary Figures.....4

S1.Supplementary Methods

Synthesis of Molecule Nap-1: Firstly, 3-(1-Naphthyl)propionic acid was dissolved in methanol with thionyl chloride and reacted at 0 ℃ for 30 minutes, heated to 70 ℃ and continued to react for 6h to yield methyl 3-(naphthalen-1-yl)propanoate. Then, methyl 3-(naphthalen-1-yl)propanoate (1 g, 4.6 mmol) and Ethylenediamine (560.9 mg, 9.3 mmol) were added to methanol (200 mL), the mixture was stirred for 24h at 80 ℃. The solvent was removed under reduced pressure to synthesis N-(2-aminoethyl)-3-(naphthalen-1-yl)propanamide. Finally, The molecular Nap-1 was prepared by N-(2-aminoethyl)-3-(naphthalen-1-yl)propanamide with delta-Gluconolactone (1.6 g, 9.3 mmol) in methanol and stirred at 80 ℃ for overnight. The solvent was removed under reduced pressure, and the filter cake washed three times with methanol, then dried under vacuum to give 1.5g white solid.

^{1}H NMR (400 MHz, DMSO) δ 8.09 (d, J = 8.3 Hz, 1H), 7.92 (d, J = 8.0 Hz, 2H), 7.77 (d, J = 7.6 Hz, 2H), 7.54 (dt, J = 20.7, 7.3 Hz, 2H), 7.46-7.34 (m, 2H), 5.38 (d, J = 4.9 Hz, 1H), 4.60-4.26 (m, 4H), 4.04-3.86 (m, 2H), 3.62-3.35 (m, 4H), 3.31-3.24 (m, 2H), 3.14 (s, 4H), 2.54 (s, 1H), 2.46 (d, J = 7.7 Hz, 1H).

MALDI-TOF: m/z (%): calcd. for $C_{21}H_{28}N_2O_7$ M^+: m/z=420.19; found $[M+Na]^+$: m/z=443.2.

Synthesis of Molecule Nap-2: The preparation method of the molecule Nap-2 was the same as the molecular Nap-1, and the precursor of the first step was 3-(2-Naphthyl)propionic acid.

^{1}H NMR (400 MHz, DMSO) δ 8.09 (d, J = 8.3 Hz, 1H), 7.94-7.87 (m, 2H), 7.77 (d, J = 7.8 Hz, 2H), 7.54 (dt, J = 19.6, 7.3 Hz, 2H), 7.45-7.33 (m, 2H), 5.38 (d, J = 4.9 Hz, 1H), 4.52 (dd, J = 16.7, 4.9 Hz, 2H), 4.46-4.28 (m, 2H), 4.03-3.88 (m, 2H), 3.61-3.43 (m, 4H), 3.31-3.24 (m, 2H), 3.14 (s, 4H), 2.46 (d, J = 7.6 Hz, 2H).

MALDI-TOF: m/z (%): calcd. for $C_{21}H_{28}N_2O_7$ M^+: m/z=420.19; found $[M+Na]^+$: m/z=443.2.

Preparation of gel samples

Preparation of Nap **1/2** assemblies in THF/H_2O mixed solution： 8mg Nap **1/2** were added to 1 ml THF/H_2O mixed solution respectively (THF/H_2O, v/v=1:2). First heated to accelerate dissolving, then cooled it to room temperature. It was found that finally Nap-1 could not be assembled into gel and existed as solution, while Nap-2 formed stable gel.

Preparation of Nap **1/2** and Eosin Y co-assemblies in THF/H_2O mixed solution：8mg Nap **1/2** were added to 1 ml THF/H_2O mixed solution respectively (THF/H_2O, v/v=1:2), and then different concentration of Eosin Y was added (5% - 20% Eosin Y).

S2. Supplementary Figures

Table S1. Solvent selection of Nap **1**/**2**

Solvent	**state 1**	**state 2**	**CGC1 (mg/mL)**	**CGC2 (mg/mL)**
Dichloromethane	P	P	-	-
Acetone	P	P	-	-
ethyl acetate	P	P	-	-
ethanol	P	P	-	-
DMF	S	S	-	-
ether	P	P	-	-
methanol	P	P	-	-
THF	S	P	-	-
DMSO	S	S	-	-
H_2O	S	P	-	-
THF-H_2O 1-2	S	G	-	8
THF-H_2O 1-4	S	P	-	-
THF-H_2O 1-6	S	P	-	-
THF-H_2O 1-8	S	P	-	-

S:solution, P:preciation, G:gel

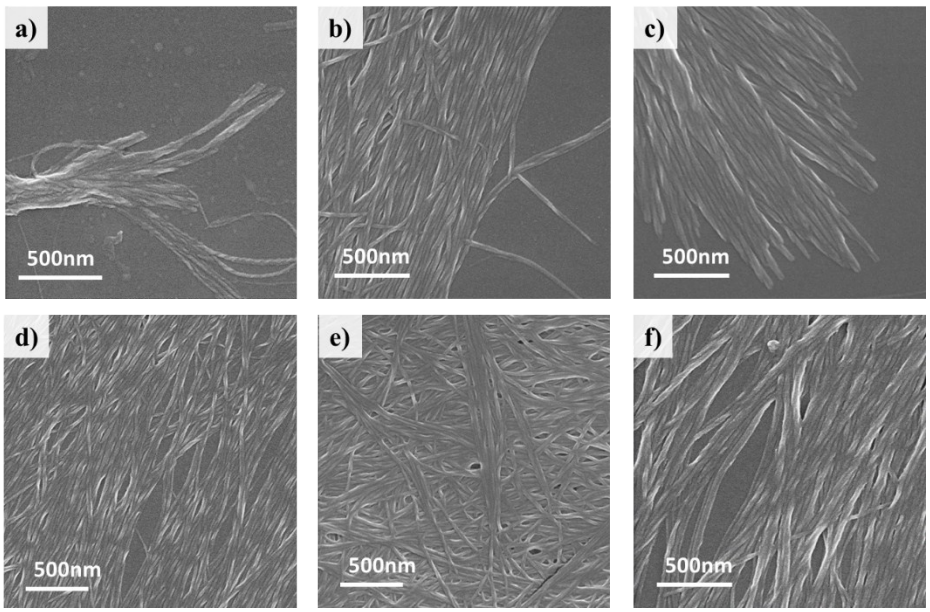

Figure S1. SEM images of Nap-**1** in a) THF, b) THF: H_2O=1:2, volume ratio, c) THF: H_2O=1:4, volume ratio, d) THF: H_2O=1:6, volume ratio, e) THF: H_2O=1:8 ,volume ratio, f) H_2O.

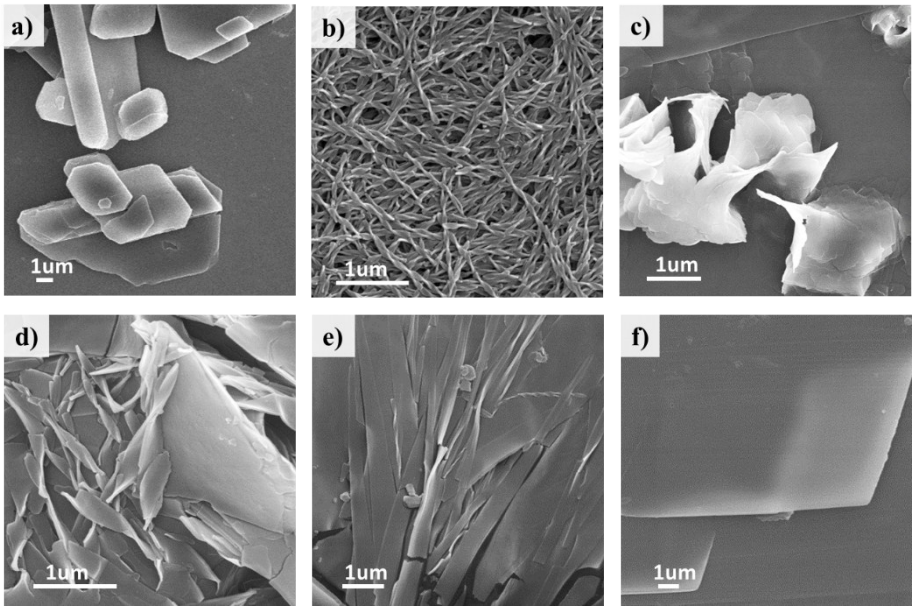

Figure S2. SEM images of Nap-**2** in a) THF, b) THF: H_2O=1:2, volume ratio, c) THF: H_2O=1:4, volume ratio, d) THF: H_2O=1:6, volume ratio, e) THF: H_2O=1:8, volume ratio, f) H_2O.

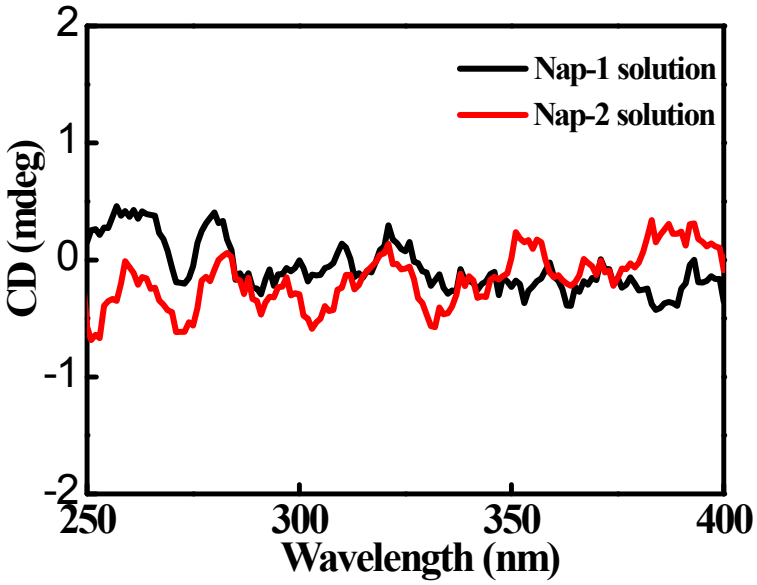

Figure S3. CD spectra of Nap-**1** (black line) and Nap-**2** (red line) in DMSO as a molecular state.

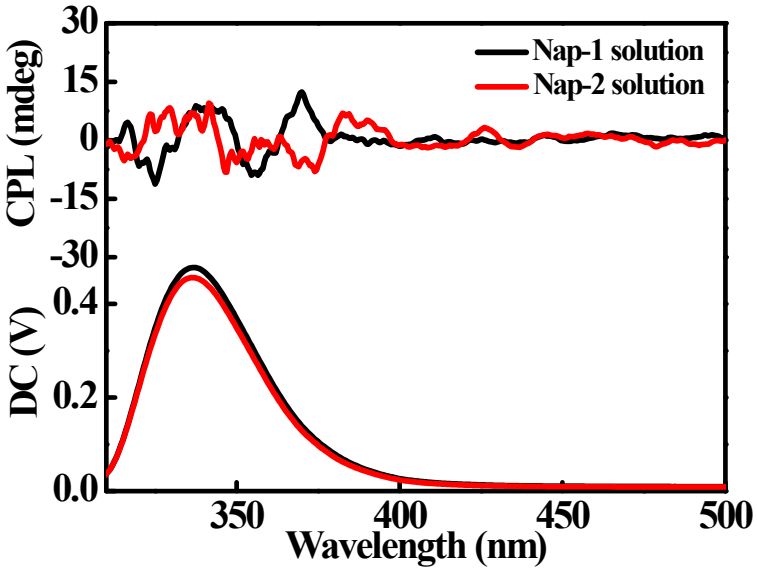

Figure S4. CPL spectra of Nap-**1** (black line) and Nap-**2** (red line) in DMSO as a molecular state.

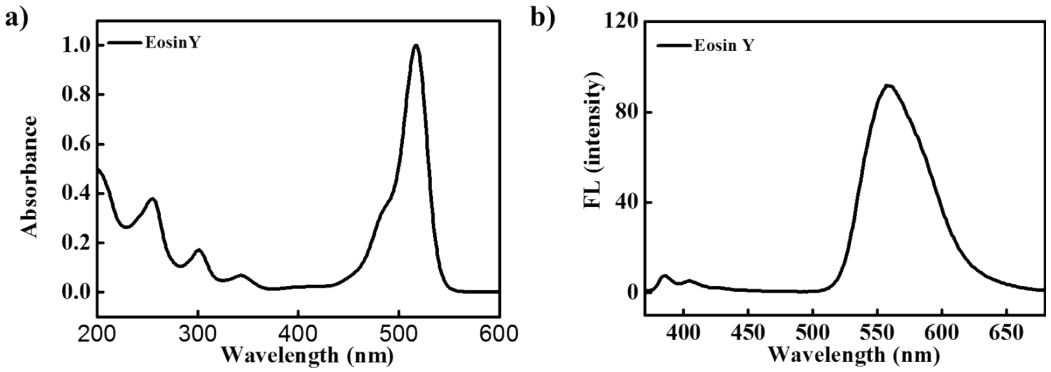

Figure S5. a) UV-Vis spectrum of Eosin Y. b) Fluorescent spectrum of Eosin Y.

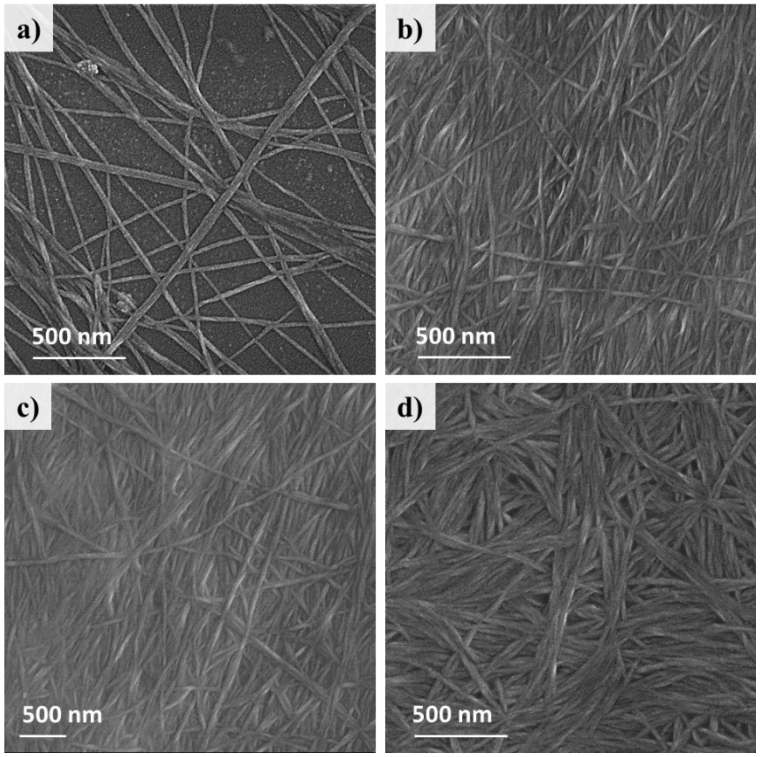

Figure S6. The SEM image of Nap-**1** and Eosin Y co-assemblies in THF/H_2O mixed solution. a) The SEM image of Nap-**1**. b), c) and d) The SEM image of Nap-**2** was co-assembled with 5%, 10%, 20% Eosin Y, respectively.

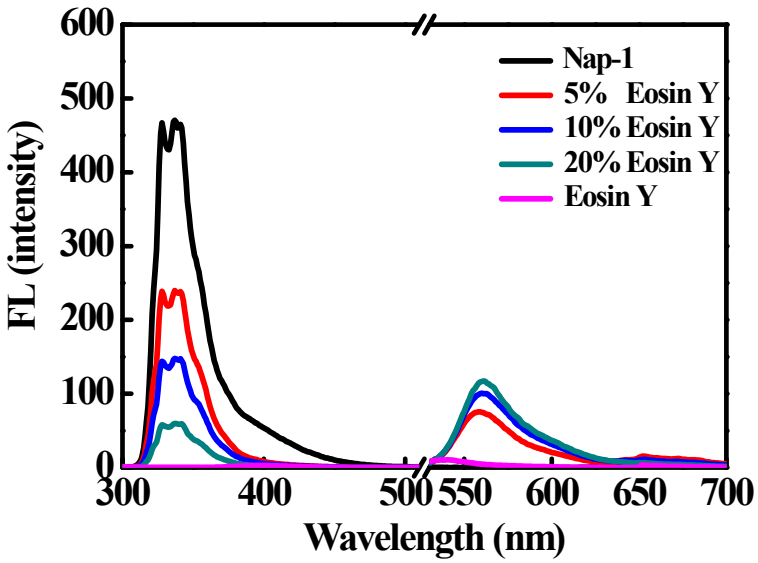

Figure S7. Fluorescence spectra of Nap-**1** with different concentrations of Eosin Y, excited at 260 nm.

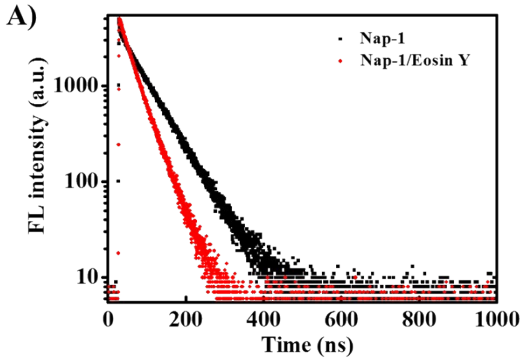

Figure S8. Time-resolved emission of Nap-**1** and Nap-**1**/20% Eosin Y co-assembly, semilogarithmic scale, detected at 320 nm. λex = 260 nm.

Table S2. The life times of Nap-**1**/Eosin Y and Nap-**2**/Eosin Y co-assemblies.

	τ(ns) Nap-**1**	τ (ns) Nap-**2**
Donor	70	65
5% EosinY	61.9	53.5
10% EosinY	57.6	53.2
20% EosinY	25.1	48

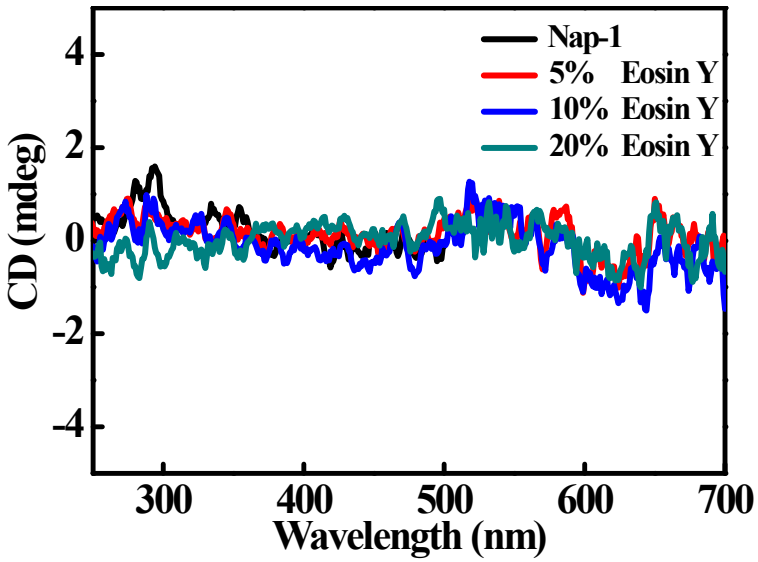

Figure S9. CD spectra of Nap-**1**/Eosin Y co-assemblies.

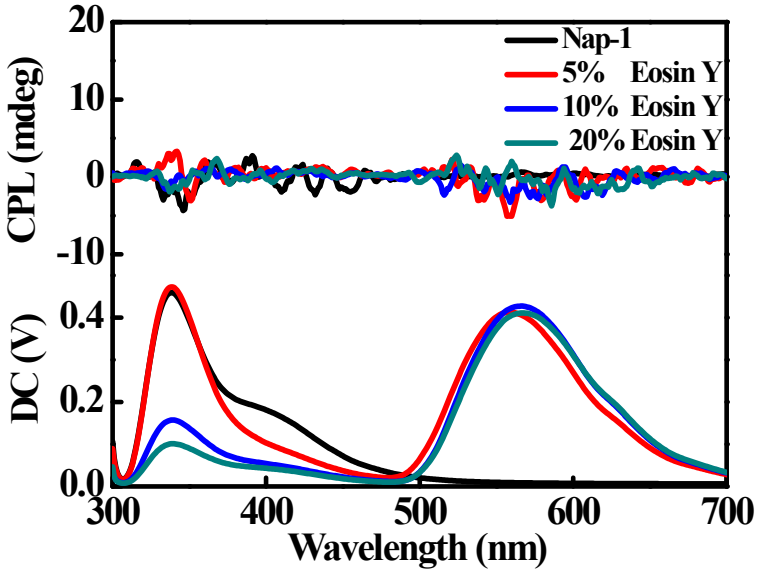

Figure S10. CPL spectra of Nap-**1**/Eosin Y co-assemblies.

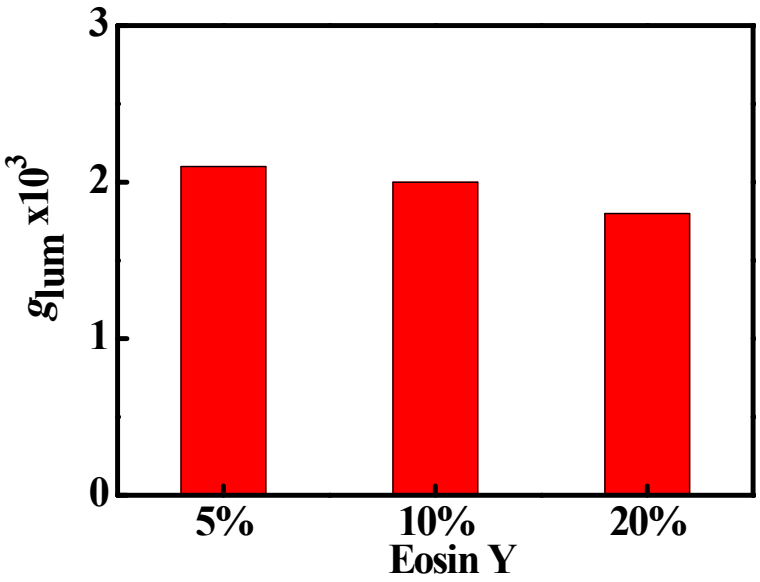

Figure S11. g_{lum} value of Nap-**2**/Eosin Y co-assemblies with different amounts of Eosin Y (λ_{ex}=260 nm).