Supplementary Materials

β -Cyclodextrin mediated construction of porous helical nanoribbons from oligoaniline derivatives

Table of Contents

1.	General information and instruments	. S2
2.	Synthesis of porous helical nanoribbons	. S2
3.	Characterization of the porous helical nanoribbons	. S3
4.	UV-vis measurements	.S3
5.	HRMS spectra	S4
6.	Molar ratio modulation between β -CD and oligoaniline	.S5
7.	TEM images of the evolution of helical nanoribbons	. S5
8.	α - or γ - cyclodextrin mediated nanostructures	S 6
9.	Circular dichroism spectra	.S6
10.	References	.S7

1. General information and instruments

All solvents were commercially obtained and without further purification except aniline monomer (Shanghai Chemical Co.), which was distilled and freshly used. Ammonium peroxydisulfate, methanol, ethanol, *n*-propanol, *i*-propanol, THF, β -cyclodextrin, deuterated DMSO, and other chemicals of analytical reagent grade were commercially obtained from Shanghai Chemical Co. and used without further purification unless otherwise stated. The morphology of the prepared samples was characterized by FESEM (S-4800, Hitachi Co., Japan) and TEM (Tecnai-2 Philip Apparatus Co., USA), respectively. High-resolution mass spectra (HRMS) data were obtained by using a BIFLEIII matrix-assisted laser desorption/ionization-time of fight mass spectrometry (MALDI-TOF MS) instrument. The FTIR spectra (670-IR + 610-IR, Varian Co., USA) were recorded in the range of 400-4000 cm⁻¹. ¹H NMR (400 MHz) spectra were recorded on an Agilent 400 spectrometer with TMS as internal standard at 298 K.

2. Synthesis of porous helical nanoribbons

The synthesis process followed a similar method as previously reported^[1], and the only variation was the addition of β -CD. Generally, 9.12 µL of aniline was dissolved in 2.25 mL isopropanol/water (isopropanol content is 40%) solvent mixture. The solution of ammonium peroxodisulfate (APS) (containing 90.8 mg of APS) was added and stirred at the designed time. Then, 0.13 g β -CD (1 equiv.) was added to the above solution and kept for 12 h at 25 °C. After that, the reaction mixture was centrifugated (10,000 r/min) three times and washed with deionized water. The resulting solid was dried at 60 °C in the oven to afford the target black powder.

3. Characterization of the porous helical nanoribbons



Supplementary Figure 1. TEM image of porous helical nanoribbons synthesized in the presence of β -CD.

4. UV-vis measurements



Supplementary Figure 2. UV-vis spectra of the addition of 1 equiv. of β -CD to the polymerization mixture at the polymerization time of: (a) 1 min; (b) 4 min; and (c) 9 min.

5. HRMS spectra



Supplementary Figure 3. Full spectrum of HRMS spectrum of the polymerization mixture at the polymerization time of 4 min.

Supplementary	Table	1.	Experimental	and	theoretical	mass	of	the	main
oligoaniline derivatives during the formation of porous helical nanoribbons									

Compound	Chemical structure	Experimenta l mass	Theoretical mass
Aniline	NH ₂	94.0669	94.0578
monomer		([M+H] ⁺)	([M+H] ⁺)
Dimer	NH ₂	187.1224	187.1157
		([M+H] ⁺)	([M+H] ⁺)
Trimer		290.1283	290.1215
		([M+H] ⁺)	([M+H] ⁺)
Pentamer		526.1548	526.1957
		([M+Na] ⁺)	([M+Na] ⁺)
Hexamer		617.2832	617.2379
	но С С Ц С С Ц С С С ОН	([M+Na] ⁺)	([M+Na] ⁺)

6. Molar ratio modulation between β -CD and oligoaniline



Supplementary Figure 4. FESEM images of porous helical nanoribbons obtained with different molar ratios of β -CD/oligoaniline: (a) 0.6; (b) 1; and (c) 2. β -CD was added at the polymerization time of 4 min.



7. TEM images of the evolution of helical nanoribbons

Supplementary Figure 5. TEM images of the β -CD mediated oligoaniline assemblies with various polymerization time: (a) 3 h; (b) 5 h; (c) 9 h; and (d) 12 h. β -CD was added at the polymerization time of 4 min.

8. α - or γ - cyclodextrin mediated nanostructures



Supplementary Figure 6. TEM images of the α -CD (a, b) and γ -CD (c, d) mediated nanostructures with 12 h polymerization time. 1 equiv. of α -CD or γ -CD was added at the polymerization time of 4 min.

9. Circular dichroism spectra

Supplementary Figure 7. CD spectra of a) porous helical nanoribbons and b) helical nanoribbons.

10. Reference

[1]. Zhou C, Ren Y, Han J, et al. Controllable supramolecular chiral twisted nanoribbons from achiral conjugated oligoaniline derivatives. *J Am Chem Soc* 2018;140:9417-25. [PMID:29923713 DOI:10.1021/jacs.7b12178]