Supplementary Information

Concentration Tailored Self-assembly Composition and Function of the Coordinating Self-assembly of Perylenetetracarboxylate

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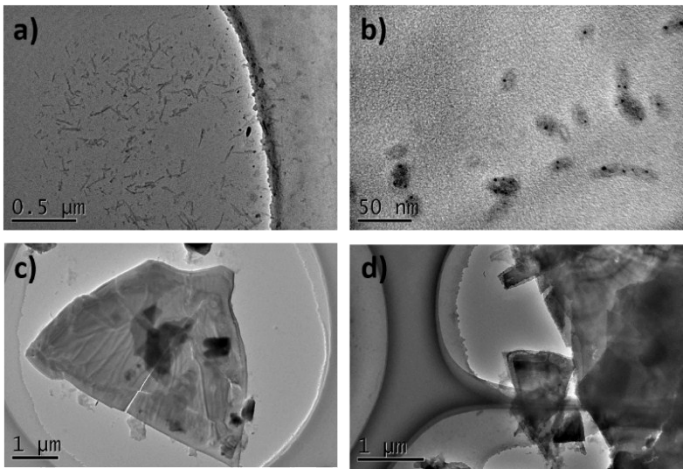

Figure. S1 TEM images of 1mM (a), (b) K_4PTC stocking solution and 10mM (c), (d) K_4PTC stocking solution without Ni^{2+}.

Table S1 The ICP results of Ni^{2+}

PTC:Ni^{2+} (mM:mM)	PTC mass molar *in sediment* (mM)	Ni concentration after dilution (ug/mL)	Ni mass molar *in sediment* (mM)	Ratio (n_{PTC}:n_{Ni2+})
1:2	2.969	0.868	3.037	0.978
2:4	7.155	1.096	7.675	0.942
3:6	13.016	1.257	14.305	0.910
4:8	16.501	1.497	18.914	0.872
5:10	19.290	1.698	23.749	0.812

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6:12	21.505	1.847	30.288	0.710
7:14	20.477	1.890	34.215	0.598
8:16	21.653	2.291	41.424	0.522
9:18	22.907	2.697	44.198	0.508
10:20	24.289	2.912	50.067	0.485

The supernatant is got in two steps (i) injecting from centrifugation for 1000r/min 10mins; (ii) filtered by 200um filter membrane. Supernatant is diluted for a suitable test condition.

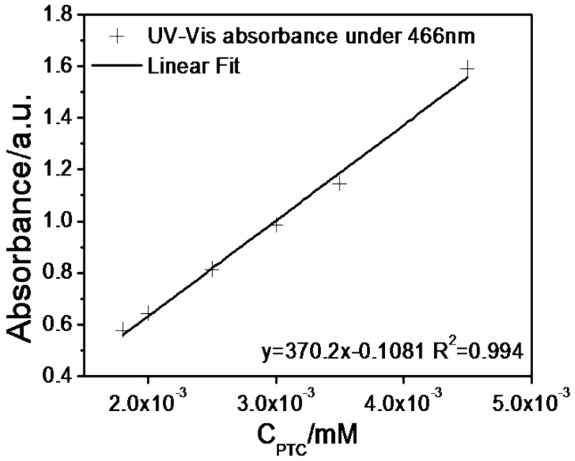

Figure. S2 The linear standard curve of PTC solution under the absorbance in λ=466nm based on Lambert-Beer Law. R^2=0.994. The absorbance of PTC in supernatant is 0.863 (diluted 20 times) and 0.815 (diluted 100 times) of microbelts and nanobelts, respectively. Supernatant is diluted for a suitable test condition. The concentration of PTC is 0.297 mM and 2.807 mM in supernatant of microbelts and nanobelts, respectively.

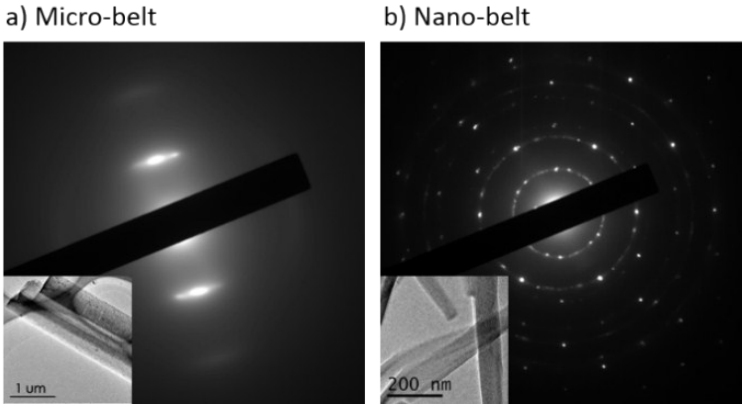

Figure. S3 SEAD pattern of a single microbelt (a) and nanobelt (b).

More regular molecular arrangements are confirmed in the SAED pattern for nanobelts, where more sharp diffraction spots can be seen. The calculated periodicity of the first innermost circle is 0.545nm and of the second innermost circle is 0.324nm; others are more advanced lattice planes which are not strongly enough to show out in the XRD pattern, because the nanobelts are not single crystals. For the microbelts, the calculated periodicity of the

only lightest minor arc is 0.335nm, corresponding to the 3.36 Å in XRD pattern.

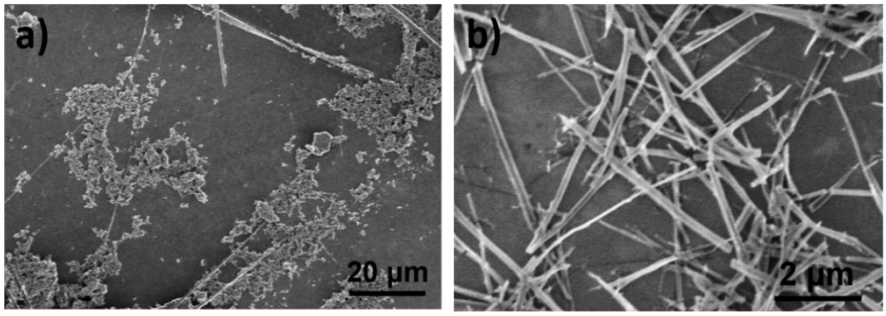

Figure. S4 (a) and (b) SEM images of microbelts precipitates incubated in the stock solution of nanobelts at 4 °C for 5 days. 5 equivalents needle crystals of microbelts formed in 1 mM PTC/2 mM Ni(II) was centrifugated, and then only the precipitates was removed into the stock solution of nanobelts of 10 mM PTC/20 mM Ni(II)s. The mixtures were incubated under at 4 °C of ice bath for 5 days.

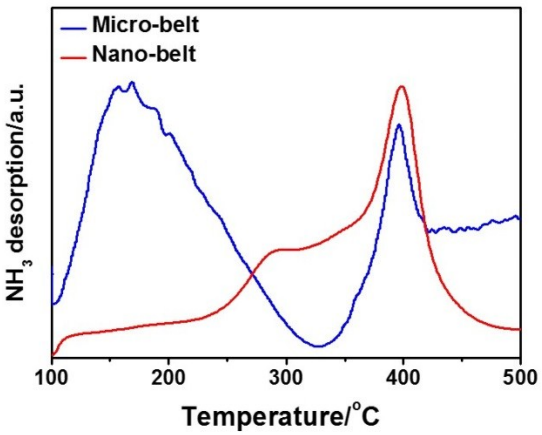

Figure.S5 NH_3 desorbed during the TPD experiments

The presence of uncoordinated groups allows specific adsorption of NH_3 at low temperature. Figure S5 shows the temperature-programmed desorption (TPD) of NH_3 on both the micro and the nanobelts. The TPD curve for the microbelts displays a broad peak ranging from 100 to 350 °C and a sharp peak centered around 400 °C, whereas that for the nanobelt only hold a sharp peak around 400°C. As a result, the adsorption capacities of NH_3 are 4.732 mM NH_3/g microbelt and 1.839 mM NH_3/g nanobelt respectively, confirming the strong adsorption ability of the microbelts. The broad peak features the adsorption from weak acid places, while the sharp peak occurred at higher temperature is characteristic of strong acidic adsorption places, which can be ascribed to NiO formed by decomposing of the PTC-Ni skeleton in the program of increasing temperature.[2] It is possible that the

uncoordinated COO- groups[3] and the nanopores in the microbelts adsorb NH_3 at lower temperature, thus producing larger adsorption ability.

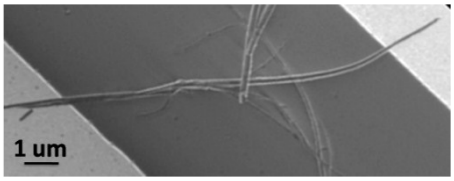

Figure. S6 The SEM measurement of nanobelts in situ corresponding to the I-V curve for weight measurement.

References

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(2) Chen, Z.; Stepanenko, V.; Dehm, V.; Prins, P.; Siebbeles, L. D. A.; Seibt, J.; Marquetand, P.; Engel, V.; Wuerthner, F. Photoluminescence and conductivity of self-assembled pi-pi stacks of perylene bisimide dyes. *Chemistry-a European Journal* **2007**, *13*, 436-449.

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