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) K₄PTC stocking solution and 10mM (c), (d) K₄PTC stocking solution without Ni²⁺.

Table S1 The ICP results of Ni²⁺

<table>
<thead>
<tr>
<th>PTC:Ni²⁺ (mM:mM)</th>
<th>PTC mass molar in sediment (mM)</th>
<th>Ni concentration after dilution (µg/mL)</th>
<th>Ni mass molar in sediment (mM)</th>
<th>Ratio (nPTC:nNi²⁺)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:2</td>
<td>2.969</td>
<td>0.868</td>
<td>3.037</td>
<td>0.978</td>
</tr>
<tr>
<td>2:4</td>
<td>7.155</td>
<td>1.096</td>
<td>7.675</td>
<td>0.942</td>
</tr>
<tr>
<td>3:6</td>
<td>13.016</td>
<td>1.257</td>
<td>14.305</td>
<td>0.910</td>
</tr>
<tr>
<td>4:8</td>
<td>16.501</td>
<td>1.497</td>
<td>18.914</td>
<td>0.872</td>
</tr>
<tr>
<td>5:10</td>
<td>19.290</td>
<td>1.698</td>
<td>23.749</td>
<td>0.812</td>
</tr>
</tbody>
</table>

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The supernatant is obtained in two steps: (i) injecting from centrifugation for 1000 r/min 10 mins; (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 $\lambda=466$nm 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\textsuperscript{3} and the nanopores in the microbelts adsorb \textit{NH}_\textsubscript{3} at lower temperature, thus producing larger adsorption ability.

\textbf{Figure. S6} The SEM measurement of nanobelts in situ corresponding to the I-V curve for weight measurement.
References

