Supporting Information

Self-assembly of tetra(aniline) nanowires in acidic aqueous medium with ultrasonic irradiation

Wei Lyu\textsuperscript{a,b}, Jiangtao Feng\textsuperscript{a}, Wei Yan\textsuperscript{a,b,*}, and Charl FJ Faul\textsuperscript{c,*}

\textsuperscript{a}Department of Environmental Science and Engineering, Xi’an Jiaotong University, Xi’an 710049, P.R. China

\textsuperscript{b}State Key Laboratory of Multiphase Flow in Power Engineering, Xi’an Jiaotong University, Xi’an, 710049, P. R. China

\textsuperscript{c}School of Chemistry, University of Bristol, BS8 1TS, Bristol, UK.

*Corresponding Author. Tel. +86-029-82664731; Fax. +86-029-82664731; E-mail. yanwei@xjtu.edu.cn (W. Yan), charl.faul@bristol.ac.uk (Charl FJ Faul)
Supplementary Figures

Figure S1. EDS spectra of different samples.
**Figure S2.** SEM images of TANI nanowires obtained in 5M HCl solution with varying ultrasonic time and power.

**Figure S3.** SEM images of TANI nanowires dedoped with deionized water (a) and NH$_3$·H$_2$O (b).
Figure S4. SEM images of the sample obtained without the addition of HCl under ultrasonic irradiation.

Figure S5. SEM images of TAN1-ES sample.
Table S1. Assignment of the Evans holes observed between 400 and 1800 cm$^{-1}$ in the infrared spectra of US-5M sample on the benzenic and quinoid rings symbolized as B and Q respectively.

<table>
<thead>
<tr>
<th>Evans holes (infrared) (cm$^{-1}$)</th>
<th>Raman</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1658 B</td>
<td>1600</td>
<td>ν(C-C)</td>
</tr>
<tr>
<td>1536 B</td>
<td>1513</td>
<td>ν(C-C)</td>
</tr>
<tr>
<td>1390 B,Q</td>
<td>1332</td>
<td>vsN-ring</td>
</tr>
<tr>
<td>1198 B</td>
<td>1175</td>
<td>δ(C-H)</td>
</tr>
<tr>
<td>860 B</td>
<td>820</td>
<td>δ(C-H)</td>
</tr>
<tr>
<td>726 B,Q</td>
<td>726</td>
<td>γ(C-C)</td>
</tr>
</tbody>
</table>

Figure S6. SEM images of TANI samples produced using different acid as doping acid.
Figure S7. Pellet (KBr) FTIR spectra of US-7M, US-5M, US-1M, and US-0.1M samples.
Figure S8. TGA curves of TANI-EB, TANI-ES, US-0.1M, US-1M, US-5M and US-7M samples. For all doped samples, there are three steps of weight loss occurred during heating cycles (in the ranges 30-150, 150-250, 250-550 °C). The first mass loss is due to unbound water, the second step of weight loss is ascribed to the loss of bound HCl acting as the dopant and the mass loss at final step is attributed to the decomposition of TANI chains.1,2 By contrast, the onset of the final weight loss steps in all doped samples are distinctly different. For US-1M and US-5M samples, the onset of the final step occurs at approximately 300 °C, with the other samples showing the onset of degradation at lower temperatures. This indicates that thermal resistant temperatures of US-1M and US-5M samples in the second step of mass loss, i.e., dedoping process, are significantly higher than that of other ES samples, demonstrating that more dopants exist in the US-1M and US-5M samples.
**Figure S9.** X-ray diffraction patterns of US-0.1M, US-1M, US-5M and US-7M samples.