Cost Effective Synthesis and Thin Film Processing of Porous Polymer Networks through Methanesulfonic Acid Mediated Aldol Triple Condensation

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Supplementary Information

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1. Photos of Reaction Process for PPN synthesis

![Photos of Reaction Process for PPN synthesis](image)

**Figure S1.** Color change during the synthesis of PPN1.

2. Elemental Analysis Results.

<table>
<thead>
<tr>
<th></th>
<th>C(%)</th>
<th>H(%)</th>
<th>N(%)</th>
<th>O(%)</th>
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<tbody>
<tr>
<td>PPN1 (experiment)</td>
<td>84.64</td>
<td>4.95</td>
<td>N/A</td>
<td>10.41&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>PPN1 (theoretical)</td>
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<td>4.79</td>
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<tr>
<td>PPN2 (experiment)</td>
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<td>PPN3 (experiment)</td>
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<td>N/A</td>
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<td>PPN4 (experiment)</td>
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<tr>
<td>PPN5 (experiment)</td>
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<td>3.98</td>
<td>9.49&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>PPN5 (theoretical)</td>
<td>90.82</td>
<td>4.76</td>
<td>4.41</td>
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<sup>a</sup> Estimated from C, H and N atoms.
3. N\textsubscript{2} Adsorption Isotherms

**Figure S2.** Plot of the linear region on the N\textsubscript{2} isotherm of PPN\textsubscript{1} sample synthesized at 110 °C for BET.

**Figure S3.** (a) N\textsubscript{2} Adsorption Isotherms of PPN\textsubscript{2} at 77K; (b) Plot of the linear region on the N\textsubscript{2} isotherm of PPN\textsubscript{2} for BET.
Figure S4. (a) $\text{N}_2$ Adsorption Isotherms of PPN3 at 77K; (b) Plot of the linear region on the N2 isotherm of PPN3 for BET.

Figure S5. (a) $\text{N}_2$ Adsorption Isotherms of PPN5 at 77K; (b) Plot of the linear region on the N2 isotherm of PPN5 for BET.
Figure S6. N₂ Adsorption Isotherms of CFP/PPN1 composite at 77K

4. TGA Data

Figure S7. TGA traces of PPN1-PPN5
5. Ultraviolet-visible absorption spectra

**Figure S8.** UV-vis spectrum of organic molecules: (a) bisphenol A, (b) bromothymol blue, (c) rhodamine B, (d) rose Bengal, (e) congo red in water absorbed by PPN1

**Figure S9.** UV-vis spectrum of methylene blue solution treated by CFP/PPN1
6. Van del Waals diameter of organic molecules

**Figure S10.** Maximal and minimal projection radius of (a) bromothymol blue, (b) rose bengal, (c) bisphenol A, (d) rhodamine B, (e) congo red, (f) methylene blue.
7. Langmuir adsorption isotherm

Figure S11. Maximum adsorption capacity of PPN1 to methylene blue solution indicated by Langmuir adsorption isotherm

8. Recycle efficiency of PPN1

Figure S12. Recycling of PPN1 for methylene blue adsorption.
9. Weight change of CFP/PPN1 composite by multiple times of loading

Figure S13 Weight change of CFP/PPN1 composite

10. SEM images

Figure S14. (a) Surface view and (b) cross-section view of CFP.
11. Solid C\textsuperscript{13} NMR

Figure S15. C CP/MAS NMR spectra of the PPN\textit{1} (from 110 °C reaction temperature) recorded at magic-angle spinning (MAS) rate of 5 kHz, asterisks (*) indicate rotational sidebands.

Figure S16. C CP/MAS NMR spectra of the PPN\textit{5} recorded at a rate of 5 kHz, asterisks (*) indicate rotational sidebands. The major two signals at 146.7 ppm and 128 ppm correspond to the carbon connected to nitrogen and other aromatic carbons, respectively.
**Figure S17.** C CP/MAS NMR spectra of the PPN4 recorded at a rate of 5 kHz, asterisks (*) indicate rotational sidebands. The signals at 149.9 ppm and 141.2 ppm correspond to substituted aromatic carbons, the signal at 128 ppm corresponds to unsubstituted aromatic carbons. The signal at 30 ppm corresponds to the carbon at the center of spirofluorene. Note that the signal/noise ratio of was still low despite 27,000 scans.