Himanshu Jasuja, and Krista S. Walton*

School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, 311 Ferst Drive NW, Atlanta, Georgia 30332, USA

* krista.walton@chbe.gatech.edu

EXPERIMENTAL SECTION

1. Characterization

1.1 PXRD (Powder X-Ray diffraction) patterns

Figure S1: Comparison of PXRD pattern for as-synthesized Zn-BDC-DABCO or DMOF and its theoretical pattern from single crystal data
Figure S2: Comparison of PXRD pattern for as-synthesized Zn-BDC-BPY or MOF-508a and its theoretical pattern from single crystal data.

Figure S3: Comparison of PXRD pattern for as-synthesized Zn-TMBDC-DABCO or DMOF-TM and its theoretical pattern from single crystal data.
Figure S4: Comparison of PXRD pattern for as-synthesized Zn-TMBDC-BPY or MOF-508-TM and its theoretical pattern from single crystal data.

Figure S5: PXRD patterns for as-synthesized Zn-BDC-BPY or MOF-508a and activated Zn-BDC-BPY or MOF-508b displaying shifting of peaks towards right on activation which was also observed by Chen et. al.1
Figure S6: PXRD patterns for as-synthesized and activated Zn-BDC-DABCO or DMOF displaying no change up on activation which was also observed by Lee et. al.²

Figure S7: Comparison of PXRD patterns for water exposed MOF-508 sample obtained in our work and reported by Liu et al.³
Figure S8: PXRD patterns as-synthesized (top), water exposed (only up to 10% RH, middle) and regenerated (bottom) Zn-TMBDC-BPY or MOF-508-TM.

Figure S9: PXRD patterns as-synthesized (top), water exposed (upon 90% RH, middle) and regenerated (bottom) Zn-BDC-DABCO or DMOF.⁴
1.2 Nitrogen adsorption isotherms

Figure S10: Nitrogen isotherm of activated Zn-BDC-DABCO or DMOF at 77 K (closed symbols – adsorption, open symbols – desorption)

Figure S11: Nitrogen isotherm of activated Zn-BDC-BPY or MOF-508b at 77 K (closed symbols – adsorption, open symbols – desorption)
Figure S12: Nitrogen isotherm of activated Zn-TMBDC-DABCO or DMOF-TM at 77 K (closed symbols – adsorption, open symbols – desorption)

Figure S13: Nitrogen isotherm of activated Zn-TMBDC-BPY or MOF-508-TM at 77 K (closed symbols – adsorption, open symbols – desorption)
Table S1: Comparison of properties of pillared MOFs

<table>
<thead>
<tr>
<th>Material</th>
<th>Pore Volume† (cm³/g)</th>
<th>Pore Diameter (c, a, b) ‡ (Å)</th>
<th>Activation Process</th>
<th>Thermal Stability ‡ (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4DMOF</strong></td>
<td>0.75</td>
<td>7.5x7.5,4.8x3.2,4.8x3.2</td>
<td>110 °C (12 h)</td>
<td>300</td>
</tr>
<tr>
<td><strong>MOF-508</strong></td>
<td>0.42</td>
<td>4x4, -, -</td>
<td>110 °C (12 h)</td>
<td>360</td>
</tr>
<tr>
<td><strong>5DMOF-TM</strong></td>
<td>0.51</td>
<td>3.5, -, -</td>
<td>110 °C (12 h)</td>
<td>320</td>
</tr>
<tr>
<td><strong>MOF-508-TM</strong></td>
<td>0.56</td>
<td>3.5,8x10,8x10</td>
<td>25 °C (12h)</td>
<td>250</td>
</tr>
</tbody>
</table>

† Obtained from the Dubinin-Astakov model of N₂ adsorption at 77K
‡ Obtained from literature1-2, 6
§ Solvent exchange with chloroform
$ Only this MOF is doubly interpenetrated 3-D pillared MOF

2. REFERENCES


