Electronic Supplementary Information

Molecular-level superhydrophobic external-surface to improve the stability of metal-organic frameworks

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Fig. S1 PXRD patterns and FT-IR spectra of (a,c) UiO-66-SO$_3$H, (b,d) PCN-222 before and after modification with OPA molecule.

Fig. S2 FT-IR spectrum of OPA molecule.
Fig. S3 SEM images of (a) UiO-66-SO$_3$H, (b) OPA-UiO-66-SO$_3$H, (c) PCN-222, and (d) OPA-PCN-222

Fig. S4 N$_2$ sorption isotherms for (a,b) UiO-66-SO$_3$H, (c,d) PCN-222 before and after OPA modification.
**Fig. S5** Pore size distribution for (a) UiO-66, (b) UiO-66-SO$_3$H, and (c) PCN-222 before and after OPA modification.

**Fig. S6** CO$_2$ adsorption and desorption isotherms for (a) UiO-66 and (b) OPA-Uio-66 samples at 273K.
Fig. S7 Photographs of OPA-Uio-66 samples after exposure to different oil solvents.

Fig. S8 PXRD patterns of OPA-Uio-66-SO$_3$H and OPA-PCN-222 sample after exposure to acidic solution for 7 days.
Fig. S9 PXRD patterns of OPA-PCN-222 samples after exposure to basic solutions.

Fig. S10 N\textsubscript{2} sorption isotherms for OPA-PCN-222 after exposure to basic water solutions for 7 days.
**Fig. S11** Digital photograph of PCN-222 upon exposure to basic solution (pH=11).

**Fig. S12** PXRD patterns of OPA-UiO-66-SO$_3$H sample after exposure to high ionic solutions for 7 days.
Fig. S13 PXRD patterns and FT-IR spectra of OPA-UiO-66 after absorption of different organic solvents.

Table S1 Water contact angle for OPA-UiO-66 and other hydrophobic MOFs.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Contact angle</th>
<th>ref</th>
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<tbody>
<tr>
<td>Fluorinated ZIF-90</td>
<td>152.4 °</td>
<td>9</td>
</tr>
<tr>
<td>NMOF-1</td>
<td>160-162 °</td>
<td>12</td>
</tr>
<tr>
<td>UHMOF-100</td>
<td>176 °</td>
<td>14</td>
</tr>
<tr>
<td>SH ZIF-67</td>
<td>146 °</td>
<td>19</td>
</tr>
<tr>
<td>UPC-21</td>
<td>145 °</td>
<td>27</td>
</tr>
<tr>
<td>Cu$_3$(NH-AM10-BTC)$_2$</td>
<td>147 °</td>
<td>31</td>
</tr>
<tr>
<td>OPA-UiO-66</td>
<td>160 °</td>
<td>This work</td>
</tr>
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