Supporting Information

Carbon nanodots functional MOFs composites by a stepwise synthetic approach: enhanced H\textsubscript{2} storage and fluorescent sensing

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Fig. S1 PXRD patterns of Cdots@UMCM-1a, as-synthesized UMCM-1, and simulated UMCM-1.

Fig. S2 EDS of (A) UMCM-1 and (B) Cdots@UMCM-1a.

Fig. S3 Pore size distributions of UMCM-1, Cdots@UMCM-1a, and Cdots@UMCM-1b, respectively.
Fig. S4 (A) and (B) H₂ storage for UMCM-1 and Cdots@UMCM-1a at ambient pressure (using the isotherms at 77 K and 87 K). (C) Isosteric heat of adsorption for H₂ on UMCM-1 and Cdots@UMCM-1a (using the isotherms at 77 K and 87 K).

Fig. S5 PXRD patterns of Cdots@UMCM-1a in different solvents.
**Fig. S6** The emission intensities of Cdots@UMCM-1a in DEF solution with different amount of NB (excited at 420 nm).

**Fig. S7** The relationship between emission intensity and different amounts for (A) NB, and (B) TNP in DEF solution of Cdots@UMCM-1a, respectively.
Fig. S8 FL spectra of Cdots@UMCM-1a (solid line) and Cdots (dash line) in DEF solution with 0 μL and 35 μL (A) NB or 0 ppm and 1000 ppm (B) TNP, respectively.

Fig. S9 PXRD patterns of Cdots@UMCM-1a after detection of NB or TNP in DEF.
**Fig. S10** Optical micrographs of (A) MOF-5 and (B) Cdot@MOF-5. (C) SEM image of Cdots@MOF-5. (D) PXRD patterns of MOF-5 simulated, MOF-5 as-syn and Cdots@MOF-5 as-syn, respectively.

**Fig. S11** Optical micrographs of (A) MOF-177 and (B) Cdot@MOF-177. (C) SEM image of Cdots@MOF-177. (D) PXRD patterns of MOF-177 simulated, MOF-177 as-syn and Cdots@MOF-177 as-syn, respectively.
**Fig. S12** EDS of (A) MOF-5 and (B) Cdots@MOF-5, respectively.

**Fig. S13** EDS of (A) MOF-177 and (B) Cdots@MOF-177, respectively.
Fig. S14 PL spectra of (A) MOF-5, and (B) Cdots@MOF-5 with excitation wavelength at 420 nm (insets: photographs of corresponding samples without (left) and with (right) UV light (365 nm)). (C) and (D) CLSM images of Cdots@MOF-5.

Fig. S15 PL spectra of (A) MOF-177, and (B) Cdots@MOF-177 with excitation wavelength at 420 nm (insets: photographs of corresponding samples without (left) and with (right) UV light (365 nm)). (C) and (D) CLSM images of Cdots@MOF-177.
<table>
<thead>
<tr>
<th>Materials</th>
<th>Surface area (m(^2) g(^{-1}))</th>
<th>Total pore volume (cm(^3) g(^{-1}))</th>
<th>Micropore volume (cm(^3) g(^{-1}))</th>
<th>Mesopore volume (cm(^3) g(^{-1}))</th>
<th>H(_2) uptake (wt %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UMCM-1</td>
<td>4150(^a)/6669(^b)</td>
<td>2.14</td>
<td>0.88</td>
<td>1.26</td>
<td>1.11</td>
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<tr>
<td>Cdots@UMCM-1a</td>
<td>3435(^a)/5512(^b)</td>
<td>1.79</td>
<td>0.68</td>
<td>1.11</td>
<td>1.22</td>
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<tr>
<td>Cdots@UMCM-1b</td>
<td>3714(^a)/5928(^b)</td>
<td>1.95</td>
<td>0.71</td>
<td>1.24</td>
<td>1.21</td>
</tr>
</tbody>
</table>

\(^a\) The surface area is estimated by applying the BET equations.

\(^b\) The surface area is estimated by applying the Langmuir equations.