Supporting Information for

Bifunctional MIL-53(Fe) with pyrophosphate-mediated peroxidase-like activity and oxidation-stimulated fluorescence switching for alkaline phosphatase detection

Kun Ye, Linjie Wang, Hongwei Song, Xin Li, Xiangheng Niu*

a Institute of Green Chemistry and Chemical Technology, School of Chemistry and Chemical Engineering, Jiangsu University, Zhenjiang 212013, China
b School of Environmental and Chemical Engineering, Jiangsu University of Science and Technology, Zhenjiang 212003, China

* Corresponding author. E-mail: niuxiangheng@126.com
Figure S1. Fluorescence spectra of TA and TA+H$_2$O$_2$.

Figure S2. EPR spectrum of the MIL-53(Fe)+H$_2$O$_2$+DMPO system.

Figure S3. Fluorescence spectra of the MIL-53(Fe)+H$_2$O$_2$ system with different
concentrations of H$_2$O$_2$.

Figure S4. Fluorescence intensity of the MIL-53(Fe)+H$_2$O$_2$ system upon reaction time.

Figure S5. Effect of buffer pH on the fluorescence intensity of the MIL-53(Fe)+H$_2$O$_2$ system.
**Figure S6.** Robustness of the synthesized MIL-53(Fe) against harsh pH. The material was first treated by incubating it in 0.1 M buffers with different pH for 2 h, and then its oxidation-stimulated fluorescence was measured under standard conditions.

**Figure S7.** Robustness of the synthesized MIL-53(Fe) against harsh temperature. The material was first treated by incubating it at different temperatures for 2 h, and then its oxidation-stimulated fluorescence was measured under standard conditions.
Figure S8. SEM image of the PPi-capped MIL-53(Fe).

Figure S9. Comparison of XRD patterns of MIL-53(Fe) and PPi-capped MIL-53(Fe).

Figure S10. Comparison of FTIR spectra of MIL-53(Fe) and PPi-capped MIL-53(Fe).
Figure S11. Effect of PPi concentration on the inhibition of the MIL-53(Fe)+H₂O₂ system.
Table S1. Performance comparison of our method with previous PPi-based fluorescent approaches for ALP detection.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Linear range (U L⁻¹)</th>
<th>LOD (U L⁻¹)</th>
<th>Detection time (min)</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPI-triggered competitive displacement of fluorescein-labeled DNA from MVCM</td>
<td>2~100</td>
<td>0.18</td>
<td>30~40</td>
<td>1</td>
</tr>
<tr>
<td>Copper-mediated DNA-scaffolded silver nanocluster switching</td>
<td>30~240</td>
<td>5</td>
<td>130~140</td>
<td>2</td>
</tr>
<tr>
<td>Inhibition of DNA-templated copper nanoparticles by PPI</td>
<td>0.3~7.5</td>
<td>0.3</td>
<td>70~80</td>
<td>3</td>
</tr>
<tr>
<td>Quenching and restoration of the fluorescence of CDs</td>
<td>2.5~40</td>
<td>1</td>
<td>120~130</td>
<td>4</td>
</tr>
<tr>
<td>PPI-mediated regulation of the fluorescence of CQDs</td>
<td>16.7~782.6</td>
<td>1.1</td>
<td>30~40</td>
<td>5</td>
</tr>
<tr>
<td>Inhibition of DNA-templated silver nanoclusters by PPI</td>
<td>0.1~250</td>
<td>0.078</td>
<td>85~95</td>
<td>6</td>
</tr>
<tr>
<td>Bifunctional MIL-53(Fe) with PPI-mediated peroxidase-like activity and oxidation-stimulated fluorescence switching</td>
<td>2~80</td>
<td>0.7</td>
<td>110~120</td>
<td>This work</td>
</tr>
</tbody>
</table>

References

