Supplementary Information

for

Confining lead-free perovskite quantum dots in metal-organic frameworks for visible light-driven proton reduction

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Table of Contents

Table S1. ICP-MS analyses of catalysts……………………………………………………………S2
Table S2. Summary of some MOF-based photocatalysts……………………………………S2
Scheme S1. Illustration of the synthetic processes of CBI@MOFs…………………………S3
Figure S1. The PXRD pattern of CP@U6N and Pt@U6N……………………………………S3
Figure S2. SEM images of CBI………………………………………………………………….S3
Figure S3. SEM images of pure MOFs………………………………………………………….S4
Figure S4. SEM images of CBI@UiO-66 and CBI@UiO-67…………………………………S4
Figure S5. HETEM image of CP@U6N and Pt particle size distribution ……………………S4
Figure S6. TEM image of Pt@U6N………………………………………………………………S5
Figure S7. XPS survey spectra of CBI, U6N and CBI@U6N……………………………………S5
Figure S8. N1s XPS spectra of CBI@U6N………………………………………………………S6
Figure S9. High-resolution XPS spectra of U6N………………………………………………S6
Figure S10. High-resolution XPS spectra of CBI…………………………………………….S7
Figure S11. Photoluminescent emission spectra…………………………………………….S7
Figure S12. Comparison of the hydrogen-evolution performance all samples ………………S7
Figure S13. XPS spectra of CBI@U6N after 5h reaction……………………………………S8
Figure S14. Optical photographs of reaction solutions………………………………………S8
Figure S15. The proposed proton-reduction mechanism……………………………………S9

References ……………………………………………………………………………………………S9
Table S1. ICP-MS analyses of catalysts

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<thead>
<tr>
<th>Sample</th>
<th>Pt wt%</th>
<th>H₂ evolution rate (μmol g⁻¹ h⁻¹)</th>
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<tr>
<td>U6N</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Pt@U6N</td>
<td>0.98</td>
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<tr>
<td>CP@U6N</td>
<td>0.78</td>
<td>141.87</td>
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Table S2. Summary of some MOF-based photocatalysts

<table>
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<tr>
<th>Sample</th>
<th>Co-catalyst</th>
<th>Light source</th>
<th>Sacrificial reagent</th>
<th>Photosensitizer</th>
<th>H₂ evolution rate (μmol g⁻¹ h⁻¹)</th>
<th>TON</th>
<th>Reference</th>
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<tr>
<td>CP@U6N</td>
<td>Pt</td>
<td>Visible</td>
<td>HPO₂</td>
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<td>TEOA</td>
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<td>341</td>
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The turnover number was calculated by the equation of TON = n(H₂)/n(Pt) based on the content of Pt.
Scheme S1. Illustration of the synthetic processes of CBI@MOFs.

Figure S1. The PXRD pattern of CP@U6N and Pt@U6N.

Figure S2. The SEM images of CBI in low resolution (a) and high resolution (b).
Figure S3. SEM images of U6N (a), UiO-66 (b) and UiO-67 (c).

Figure S4. SEM images of CBI@UiO-66 (a) and CBI@UiO-67 (b).

Figure S5. HRTEM image of CP@U6N (a) and Pt particle size distribution of CP@U6N (b).
Figure S6. TEM image of Pt@U6N.

Figure S7. XPS survey spectra of U6N, CBI and CBI@U6N.
Figure S8. High-resolution N1s XPS spectra of CBI@U6N.

Figure S9. High-resolution C1s (a), N1s (b), O1s (c), and Zr3d (d) of U6N.
Figure S10. High-resolution Cs3d (a), I3d (b) and Bi4f (c) XPS spectra of CBI.

Figure S11. Photoluminescent emission spectra of U6N, CBI@U6N, Pt@U6N and CP@U6N.

Figure S12. The hydrogen evolution curves (a) and rates (b) of pure MOFs, CBI and CBI@MOFs under visible light. Reaction conditions: 4 mL TEOA, 20 mg of catalyst, 36 mL acetonitrile and 1 mL H2O, 300W Xe lamp without filter.
Figure S13. XPS survey spectra (a) and high-resolution C1s (b), N1s (c), O1s (d), and Zr3d (e), I3d (f) and Bi4f (g Cs3d (h) spectra of CBI@U6N after 5h reaction.

Figure S14. Optical photograph of the reaction solution of CBI@U6N (left) and photocatalytic reaction after 5h without any H$_3$PO$_2$ (right).
Figure S15. The proposed electron transfer and proton reduction mechanism in CBI@U6N and CP@U6N.

References


