Supporting Information

Janus CoN/Co Cocatalyst in Porous N-doped Carbon: toward Enhance Catalytic Activity of Hydrogen Evolution

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Supplementary Figures

![Supplementary Figures](image)

**Figure S1** TEM images for Co containing polymer calcinated at 700 °C (A), 800 °C (B), 900 °C (C). Comparative XRD patterns (D), N2 adsorption-desorption isotherms and LSV curves (F) for Co containing polymer calcinated at 700 °C 800 °C and 900 °C.
Figure S2 TEM images for Co/CoN-NC with coexsitance of two phases.

Figure S3 Thermogravimetric curve for Co/CoN-NC and Co-NC.

Table S1. Chemical composition of the two catalysts.

<table>
<thead>
<tr>
<th>Catalysts</th>
<th>C</th>
<th>Co</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-NC (wt%)</td>
<td>74.37</td>
<td>10.06</td>
<td>1.25</td>
</tr>
<tr>
<td>Co/CoN-NC (wt%)</td>
<td>76.31</td>
<td>13.14</td>
<td>4.70</td>
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</table>
Table S2. Comparison of the electrocatalytic activity of transition metal nitride catalysts for HER.

<table>
<thead>
<tr>
<th>Catalysts</th>
<th>Electrolyte</th>
<th>Overpotential at 10 mA/cm² (mV)</th>
<th>Stability</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co/CoN-NC</td>
<td>0.5 M H₂SO₄</td>
<td>150</td>
<td>100 hours@ j = 10 mA/cm²</td>
<td>This work</td>
</tr>
<tr>
<td>Co/CoN-NC</td>
<td>1 M KOH</td>
<td>190</td>
<td>100 hours@ j = 10 mA/cm²</td>
<td>This work</td>
</tr>
<tr>
<td>Co₀.₆Mo₁.₄N₂</td>
<td>0.1 M HClO₄</td>
<td>200</td>
<td>3000 cycles between +0.2 to -0.3 V vs. RHE</td>
<td><em>J. Am. Chem. Soc.</em> 2013, 135, 19186.</td>
</tr>
<tr>
<td>MoN/C</td>
<td>0.1 M HClO₄</td>
<td>157</td>
<td>2000 cycles between 0.3 + 0.9 V vs. RHE</td>
<td><em>Angew. Chem. Int. Ed.</em> 2012, 51, 6131.</td>
</tr>
<tr>
<td>Material</td>
<td>Acid</td>
<td>Current Density</td>
<td>Time</td>
<td>Conditions</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------</td>
<td>-----------------</td>
<td>-------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Ni</td>
<td>0.1 M HClO₄</td>
<td>78</td>
<td></td>
<td>2000 cycles between 0.3 + 0.9 V vs. RHE</td>
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<tr>
<td>W₂N on W</td>
<td>0.5 M H₂SO₄</td>
<td>480</td>
<td>8 h</td>
<td></td>
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<tr>
<td>Mo₂N/C</td>
<td>0.1 M HClO₄</td>
<td>300</td>
<td></td>
<td>3000 cycles between -0.3 to +0.63 V vs.</td>
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<tr>
<td>P-WN/rGO</td>
<td>0.5 M H₂SO₄</td>
<td>85</td>
<td></td>
<td>20 h @ $\eta = 120$ mV.</td>
</tr>
<tr>
<td>WN/rGO</td>
<td>0.5 M H₂SO₄</td>
<td>265</td>
<td></td>
<td>20 h @ $\eta = 120$ mV.</td>
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<tr>
<td>MoN nanosh eets</td>
<td>0.5 M H₂SO₄</td>
<td>225</td>
<td></td>
<td>3000 CV cycles between -0.3 to 0.2 V vs. RHE</td>
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<tr>
<td>WN nanoarray on carbon cloth</td>
<td>0.5 M H₂SO₄</td>
<td>198</td>
<td></td>
<td>60 h @ 227 mV.</td>
</tr>
<tr>
<td>PANICo750 A</td>
<td>0.5 M H₂SO₄</td>
<td>138</td>
<td>40 h</td>
<td></td>
</tr>
</tbody>
</table>