Electronic Supplementary Information

High efficient photocatalytic hydrogen evolution of graphene/YInO$_3$ nanocomposites under visible light irradiation

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**Fig. S1** XRD patterns of G/YIO nanocomposites with different graphene contents.

**Fig. S2** The TEM image of YIO with different magnifications and the diameter distributions of YIO nanoparticles.
**Fig. S3** The TEM image of YIO with different magnifications and the diameter distributions of YIO nanoparticles.

From Fig. S2† and S3†, it can be seen that YIO exhibits a fine rod or spherical shape and the particles linked end-to-end to form a net structure with a large degree of porosity. Because of overlap inside the net structure, we calculated the diameter distributions from the particles with clear boundary. The mean diameter was about 100 nm.
**Fig. S4** The TEM images of Pt0.5/YIO composite.

**Fig. S5** FTIR spectra of GO, graphene, YIO and G0.5/YIO nanocomposite with different magnifications.

**Table S1** BET surface areas of G/YIO nanocomposites. Unit: m² g⁻¹.

<table>
<thead>
<tr>
<th>Samples</th>
<th>G0/YIO</th>
<th>G0.1/YIO</th>
<th>G0.3/YIO</th>
<th>G0.5/YIO</th>
<th>G0.7/YIO</th>
<th>G1/YIO</th>
<th>G2/YIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>S_BET</td>
<td>7.64</td>
<td>8.58</td>
<td>10.17</td>
<td>13.26</td>
<td>13.88</td>
<td>17.13</td>
<td>19.29</td>
</tr>
</tbody>
</table>
The influence of the amount of Pt loading on photocatalytic activity of Pt/YIO composites is shown in Fig. S3. In the absence of Pt, the photocatalytic activity was negligible for pure YIO. The addition of Pt significantly promoted the H₂ evolution. The activity increased with increasing the Pt loading and reached the maximum at Pt loading of 0.5 wt%. Further increase resulted an obvious activity fall.
**Fig. S7** XRD pattern of G0.5/YIO nanocomposite after photocatalytic reaction for 40 h.

**Fig. S8** XPS spectra of Y 3d, In 3d and C 1s for G0.5/YIO nanocomposite after photocatalytic reaction for 40 h.