Supporting information

Layered crystalline ZnIn$_2$S$_4$ nanosheets:
CVD synthesis and photo-electrochemical properties

Wenjin Yang,¹, ² Baodan Liu,¹, ², * Tao Fang,³ Weimmerskirch-Aubatin Jennifer,⁴ Labbé Christophe,⁴ Zhaosheng Li,³, * Xinglai Zhang,¹, ² Xin Jiang¹, ²,*

¹Shenyang National Laboratory for Materials Science (SYNL), Institute of Metal Research (IMR), Chinese Academy of Sciences (CAS), No. 72, Wenhua Road, Shenhe District, Shenyang 110016, China

²School of Materials Science and Engineering, University of Science and Technology of China

³Ecomaterials and Renewable Energy Research Center, Department of Physics, Nanjing University, Nanjing 210093, China

⁴Centre de Recherche sur les Ions, les Matériaux et la Photonique, Normandie Univ, ENSICAEN, UNICAEN, CEA, CNRS, CIMAP, 14000 Caen, France

*To whom correspondence should be addressed: baodanliu@imr.ac.cn
Figure S1 (a-b) Cross-section SEM images of ZnIn$_2$S$_4$ nanosheets grown on silicon substrate and (c-f) their corresponding EDS spectra collected from positions 1-4.
Figure S2 (a-d) SEM images of ZnIn$_2$S$_4$ nanosheets and microflowers at different growth stages and (e-g) their corresponding EDS spectra;
Figure S3 (a) STEM image of ZnIn$_2$S$_4$ nanosheets and (b-d) their spatially resolved elemental mapping of In, Zn, and S elements, respectively.
Figure S4 TEM image, EDS spectra and quantitative results of ZnIn$_2$S$_4$ nanosheets

<table>
<thead>
<tr>
<th>Position</th>
<th>Zn%</th>
<th>In%</th>
<th>S%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.1</td>
<td>41.9</td>
<td>47.0</td>
</tr>
<tr>
<td>2</td>
<td>11.9</td>
<td>34.5</td>
<td>53.6</td>
</tr>
<tr>
<td>3</td>
<td>9.5</td>
<td>32.8</td>
<td>57.7</td>
</tr>
<tr>
<td>4</td>
<td>12.0</td>
<td>30.1</td>
<td>57.9</td>
</tr>
</tbody>
</table>
Figure S5 Typical TEM image of ZnIn$_2$S$_4$ microflower
Figure S6 AFM images of ZnIn$_2$S$_4$ nanosheet and corresponding height results