Supporting Information

Electronic engineering of CoSe/FeSe$_2$ hollow nanosphere for efficient water oxidation

Yi Zhang,$^a$ Jie Xu,$^a$ Lin Lv,$^c$ Aiwu Wang,$^d$ Baoshun Zhang,$^b$ Yigang Ding$^a$ and Chundong Wang$^{b,c}$

$^a$School of Chemical Engineering and Pharmacy, Key Laboratory of Green Chemical Process of Ministry of Education, Key Laboratory of Novel Reactor and Green Chemical Technology of Hubei Province, Wuhan Institute of Technology, Wuhan 430073, China

$^b$Key Laboratory of Nanodevices and Applications, Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, Suzhou 215123, China

$^c$Wuhan National Laboratory for Optoelectronics, School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan 430074, China

$^d$Center for Advanced Material Diagnostic Technology, College of Engineering Physics, Shenzhen Technology University, Shenzhen 518118, China

* Corresponding author

E-mail address: apcdwang@hust.edu.cn (C. Wang)
Fig. S1 XRD patterns of Co-Fe selenides with different metal atomic ratios (2:3 and 1:4).
**Fig. S2** FE-SEM images of (a) CoSe, (b) $\text{Co}_{0.8}\text{Fe}_{0.2}$-Se, (c) $\text{Co}_{0.6}\text{Fe}_{0.4}$-Se, (d) $\text{Co}_{0.4}\text{Fe}_{0.6}$-Se, (e) $\text{Co}_{0.2}\text{Fe}_{0.8}$-Se and (f) FeSe$_2$. 
Fig. S3 (a) \( \text{N}_2 \) adsorption-desorption isotherm of CoSe@FeSe\(_2\). (b) The corresponding pore distribution curve.
Fig. S4 XPS survey spectrum of CoSe@FeSe$_2$. 
Fig. S5 (a) Polarization curves with iR compensation and (b) Tafel slope curves of FeSe$_2$. 

[Graphs showing polarization and Tafel slope curves with annotations: $\eta = 495$ mV, 111.5 mV dec$^{-1}$]
Fig. S6 (a) Plots of current density vs. scan rate (at 1.15 V). (b-h) CV curves of Co-Fe selenides with different metal atomic ratios (1:1, 4:1, 3:2, 2:3, 1:4, 1:0 and 0:1) in the potential range of 1.1-1.2 V vs. RHE.
Fig. S7 The OER polarization curves normalized to the ECSA.
Fig. S8 The amount of generated O₂ gas for CoSe@FeSe₂ in 150 min.
Fig. S9 XPS spectra of CoSe@FeSe$_2$ after 12h durability test towards OER: (a) survey scan, (b) Co 2p, (c) Fe 2p and (d) Se 3d.
<table>
<thead>
<tr>
<th>Sample</th>
<th>Co (mg g⁻¹)</th>
<th>Fe (mg g⁻¹)</th>
<th>Se (mg g⁻¹)</th>
<th>Co/Fe feed atomic ratio</th>
<th>Co/Fe real atomic ratio</th>
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<tbody>
<tr>
<td>Co₀.₈Fe₀.₂-Se</td>
<td>276.07</td>
<td>59.29</td>
<td>458.11</td>
<td>4:1</td>
<td>4.41:1</td>
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<td>Co₀.₆Fe₀.₄-Se</td>
<td>216.02</td>
<td>132.06</td>
<td>408.27</td>
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<td>3.10:2</td>
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<td>Co₀.₅Fe₀.₅-Se</td>
<td>192.78</td>
<td>179.15</td>
<td>455.49</td>
<td>1:1</td>
<td>1.01:1</td>
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<td>Co₀.₄Fe₀.₆-Se</td>
<td>147.33</td>
<td>196.33</td>
<td>448.43</td>
<td>2:3</td>
<td>2.13:3</td>
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<td>Co₀.₂Fe₀.₈-Se</td>
<td>82.99</td>
<td>296.05</td>
<td>473.62</td>
<td>1:4</td>
<td>1.06:4</td>
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