

## **Self-assembled Co<sub>0.85</sub>Se/carbon nanowires as highly effective and stable electrocatalyst for hydrogen evolution reaction**

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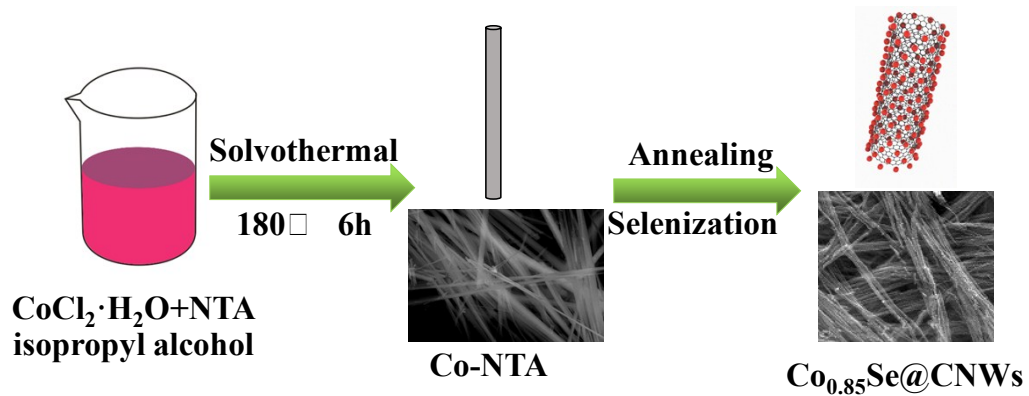
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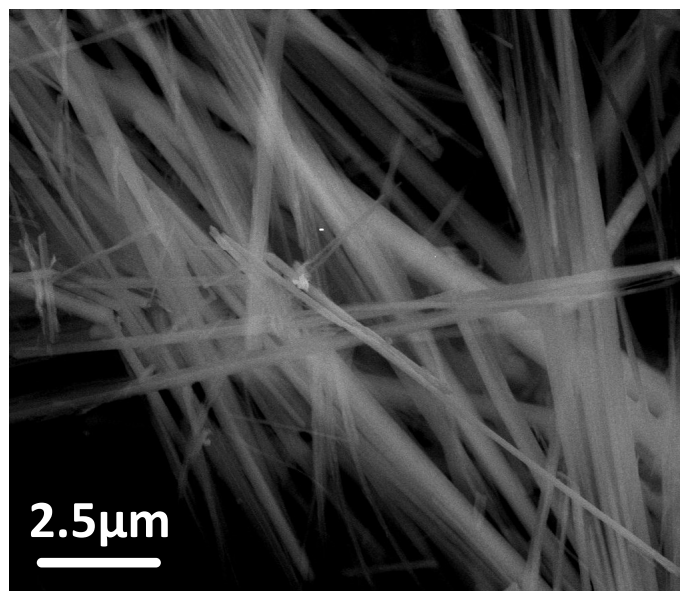
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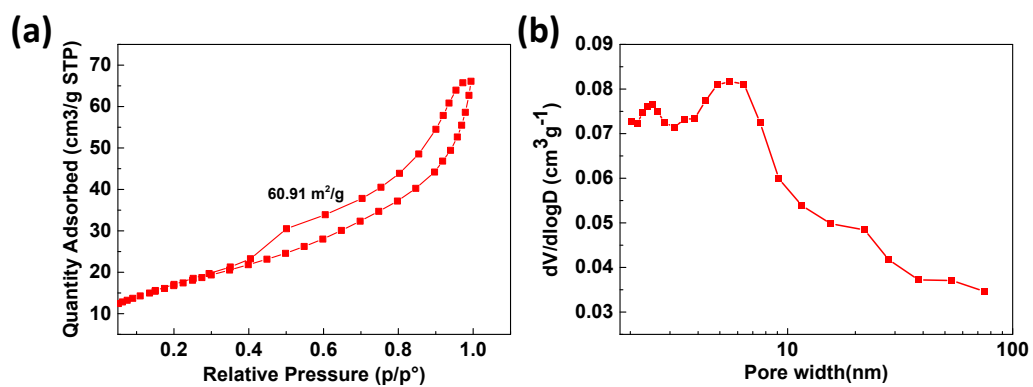
**Fig. S1:** Schematic of experimental route of  $\text{Co}_{0.85}\text{Se}@ \text{CNWs}$ .



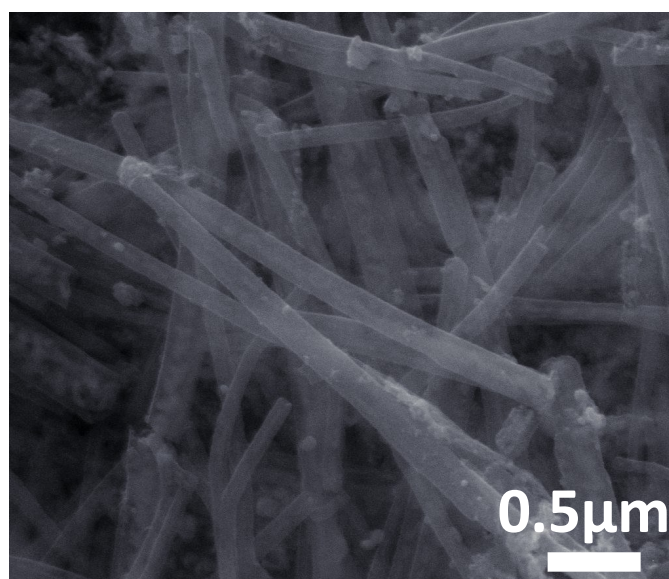
**Fig. S2:** The annealing process and selenization process for  $\text{Co}_{0.85}\text{Se}@ \text{CNWs}$ .



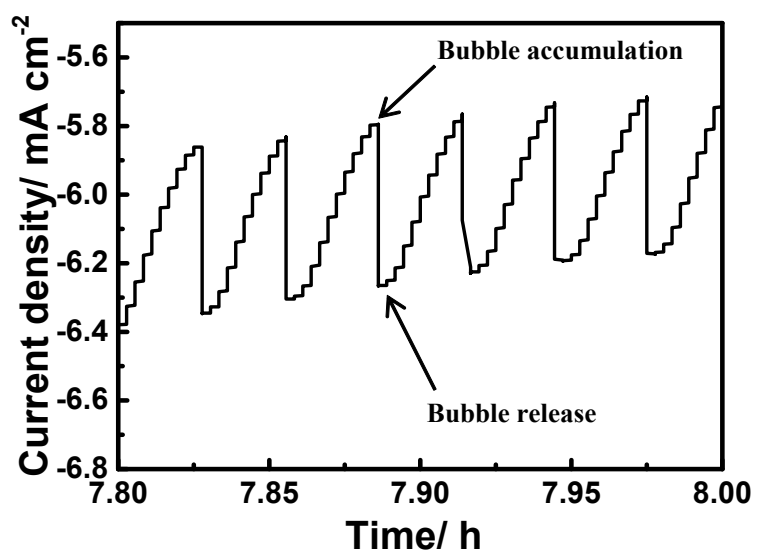
**Fig. S3:** SEM image of Cobalt-NTA.



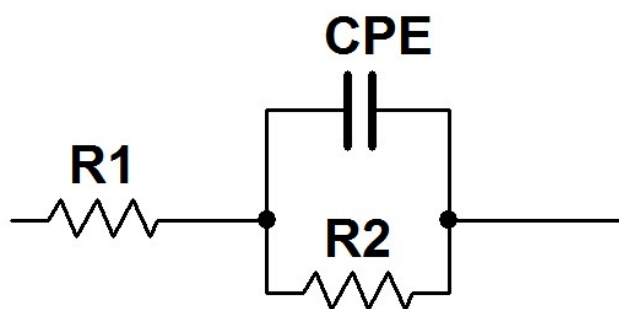
**Fig. S4:** (a) Nitrogen adsorption/desorption isotherm and (b) pore size distribution plot of Co<sub>0.85</sub>Se@CNWs.



**Fig. S5:** The SEM image of Co<sub>0.85</sub>Se@CNWs after long-term HER stability test.



**Fig. S6:** Time dependence of current density of partial enlarged detail about  $\text{Co}_{0.85}\text{Se@CNWs}$ .



**Fig. S7:** The equivalent circuit diagrams.

Tab. S1 | Comparison of catalytic parameters of different HER catalysts

| <b>Samples</b>                      | <b>Overpotential<br/>(mV vs RHE)<br/>@10 mA/cm<sup>2</sup></b> | <b>Tafel slope<br/>(mVdec<sup>-1</sup>)</b> | <b>electrolyte</b>                   | <b>References</b> |
|-------------------------------------|--|---|--------------------------------------|-------------------|
| Co <sub>0.85</sub> Se@CNWs          | 214  | 43.4  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | This work         |
| Ni <sub>0.85</sub> Se <sup>1</sup>  | 246  | 49.3  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 1                 |
| CoSe <sub>2</sub> <sup>2</sup>      | 145  | 65.9  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 2                 |
| CoSe <sub>2</sub> @DC <sup>3</sup>  | 150  | 82  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 3                 |
| CoSe <sub>2</sub> <sup>3</sup>      | 270  | 91.4  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 3                 |
| NiSe <sub>2</sub> <sup>4</sup>      | 190  | 44  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 4                 |
| NiSe <sub>2</sub> /CNT <sup>5</sup> | 200  | 29  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 5                 |
| Pt/C                                | -  | 30  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | This work         |
| Pt/C <sup>6</sup>                   | -  | 31  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 6                 |
| Pt/C <sup>7</sup>                   | -  | 30.6  | 0.5 M H <sub>2</sub> SO <sub>4</sub> | 7                 |

## References

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