Supporting Information

Papillae-like morphology of Ni/Ni(OH)₂ hybrid crystal by stepwise electrodeposition for synergistically improved HER

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Figure S1. Photograph for the bare Ni foam (left), 1st-Ni/Ni(OH)₂/NF (middle), and 2nd-Ni/Ni(OH)₂/NF-500 (right).

Figure S2. SEM images for bare Ni foam.
Figure S3. SEM images of 3rd-Ni/Ni(OH)\textsubscript{2}/NF-500 (a, b) and 4th-Ni/Ni(OH)\textsubscript{2}/NF-500 (c, d).

Figure S4. XPS spectra of O 1s region of 1st-Ni/Ni(OH)\textsubscript{2}/NF, 2nd-Ni/Ni(OH)\textsubscript{2}/NF-500 and c-Ni/Ni(OH)\textsubscript{2}/NF-500.
Figure S5. (a) The LSV curves for 1st-Ni/Ni(OH)\(_2\)/NF, 2nd-Ni/Ni(OH)\(_2\)/NF-100, 2nd-Ni/Ni(OH)\(_2\)/NF-200, 2nd-Ni/Ni(OH)\(_2\)/NF-300, 2nd-Ni/Ni(OH)\(_2\)/NF-400, 2nd-Ni/Ni(OH)\(_2\)/NF-500, 2nd-Ni/Ni(OH)\(_2\)/NF-1000, 2nd-Ni/Ni(OH)\(_2\)/NF-1500 at a scan rate of 2 mV s\(^{-1}\) in 1 M KOH for HER. (b) The overpotential of HER activity at \(j = 10\) mA cm\(^{-2}\) with different second step electrodeposition time.

Figure S6. The LSV curves for 2nd-Ni/Ni(OH)\(_2\)/NF-500, 3rd-Ni/Ni(OH)\(_2\)/NF-500, and 4th-Ni/Ni(OH)\(_2\)/NF-500 at a scan rate of 2 mV s\(^{-1}\) in 1 M KOH for HER.
Figure S7. Cyclic voltammograms of (a) 1st-Ni/Ni(OH)$_2$/NF, (b) 2nd-Ni/Ni(OH)$_2$/NF-500, and (c) c-Ni/Ni(OH)$_2$/NF-500.

Figure S8. XPS spectrum of Ni 2p for the 2nd-Ni/Ni(OH)$_2$/NF-500 after 20 h continuous test.
Table S1. Comparison of the HER performance of 2nd-Ni/Ni(OH)$_2$/NF-500 with the previously reported Ni-based and Ni(OH)$_2$-based electrocatalysts.

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<th>Catalyst</th>
<th>Overpotential at 10 mA cm$^{-2}$ (mV vs RHE)</th>
<th>Electrolyte</th>
<th>Reference</th>
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References