

Electronic supplementary information

Electro-synthesis of 3D porous hierarchical Ni-Fe phosphate film/Ni foam as high-efficiency bifunctional electrocatalyst for overall water splitting

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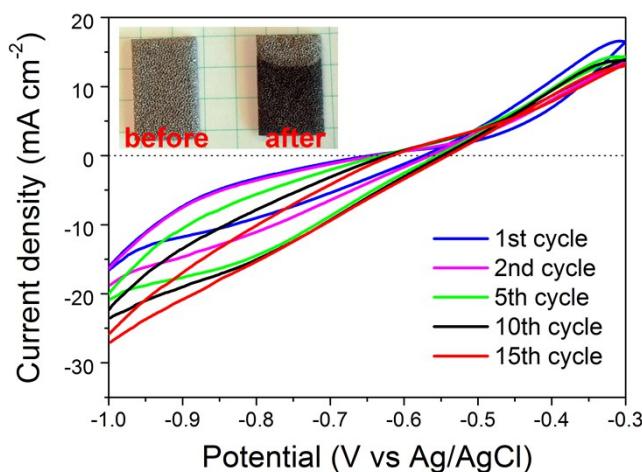


Figure S1 Electrodeposition of NiFe-P catalysts at CV mode for 15 cycles, inset shows the photograph of Ni foam before and after deposition.

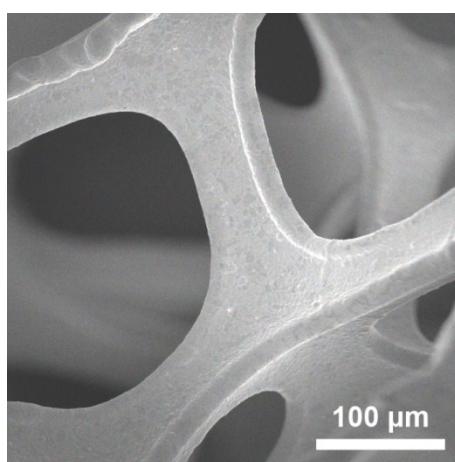


Figure S2 SEM image of pristine Ni foam.

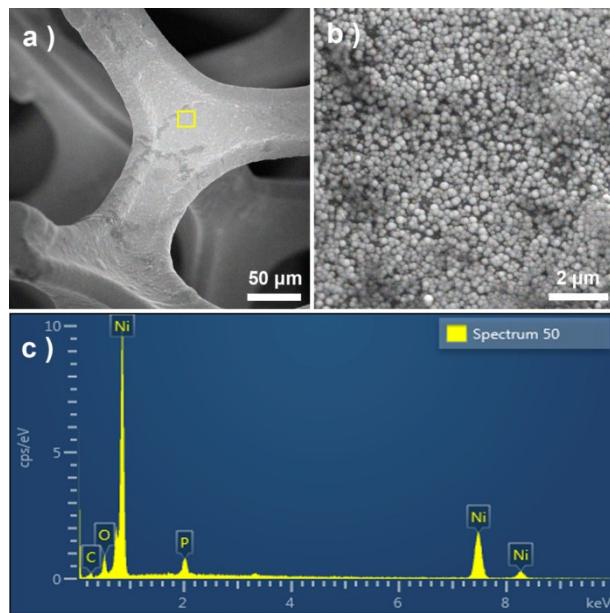


Figure S3 (a) Low and (b) high magnification SEM images and (c) EDX spectrum of as-deposited Ni-P on Ni foam.

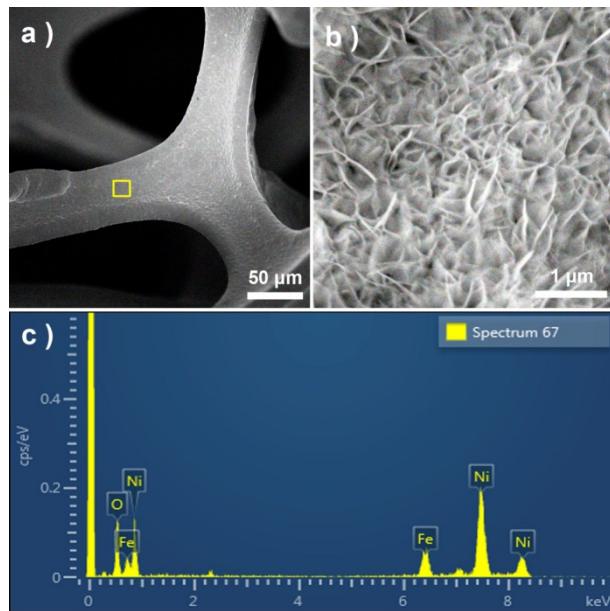


Figure S4 (a) Low and (b) high magnification SEM images and (c) EDX spectrum of as-deposited NiFe-OH on Ni foam.

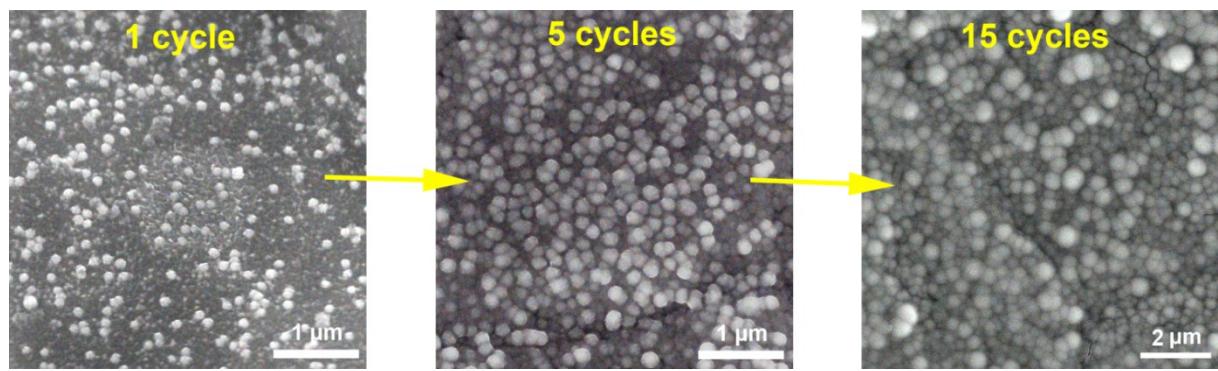


Figure S5 Surface morphology evolution of NiFe-P during electrodeposition at CV mode.

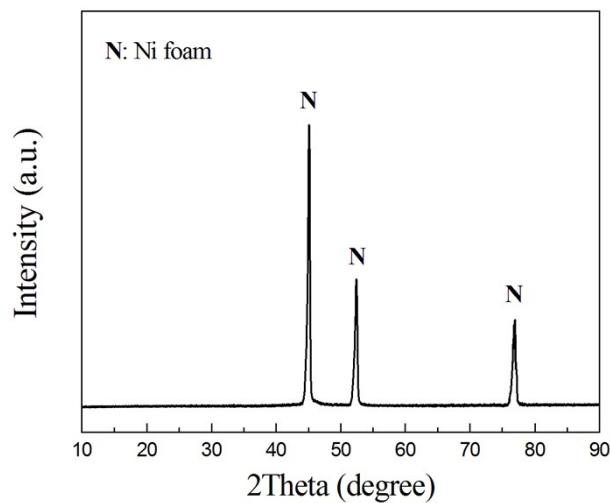


Figure S6 XRD spectra of as-obtained NiFe-P.

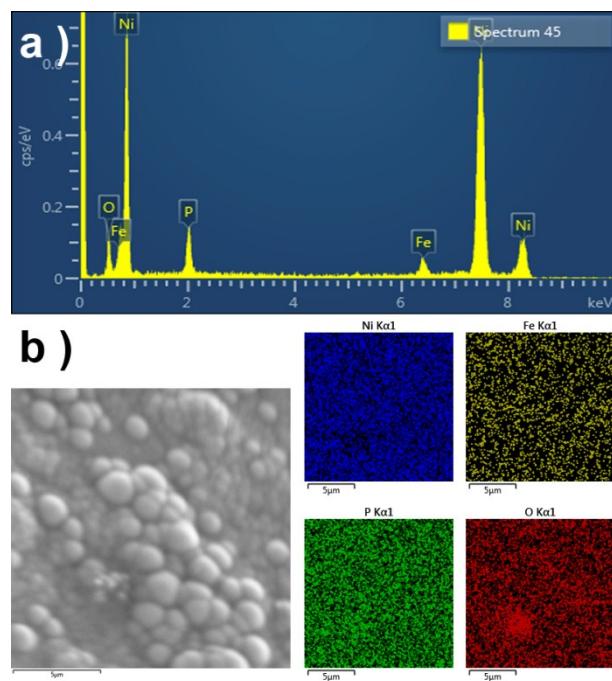


Figure S7 (a) EDX spectrum and (b) EDX mapping images of the as-prepared NiFe-P.

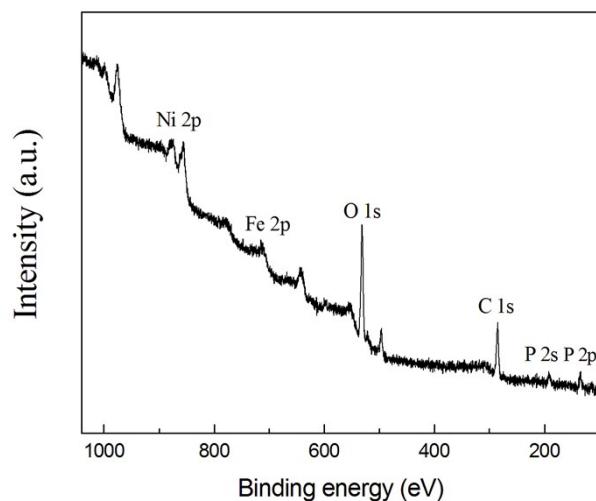


Figure S8 XPS survey spectrum of as-prepared NiFe-P.

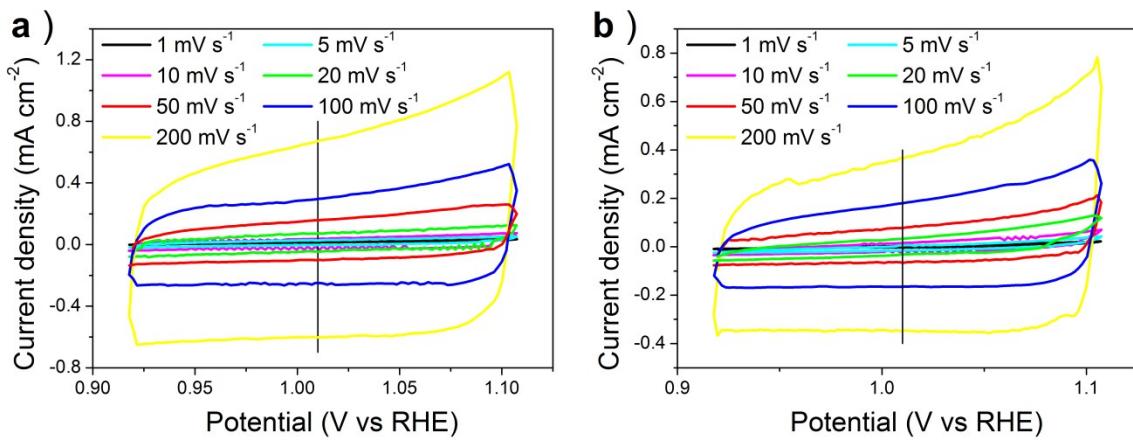


Figure S9 CV curves of (a) NiFe-P and (b) Ni-P obtained at 0.917~1.107 V vs RHE with different potential scanning rates.

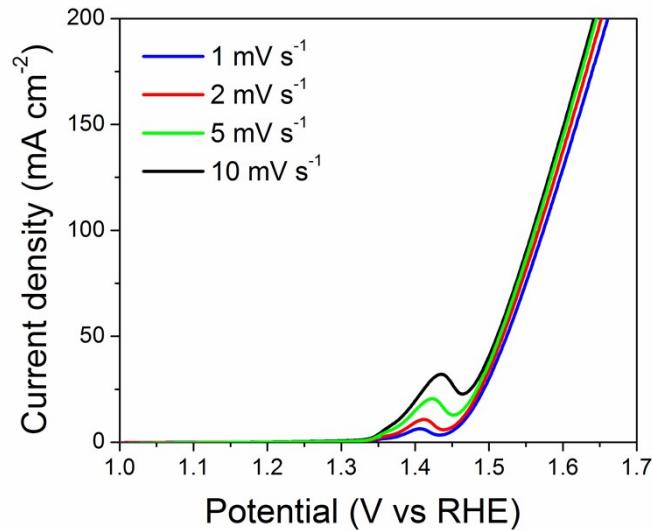


Figure S10 Polarization curves of NiFe-P catalyst obtained in 1 M KOH under various potential scanning rates.



Figure S11 Photograph of two-electrode electrochemical cell for overall water splitting

Table S1 Comparison of various bifunctional electrocatalysts for overall water splitting

Catalyst	j (mA cm ⁻²)	η_j (mV)	Reference
NiFe phosphates	10	326	This work
	20	385	
NiFe LDHs	10	470	<i>Science</i> 2014 , <i>345</i> , 1593
Ni phosphorous nanoparticles	10	450	<i>J. Power Sources</i> 2015 , <i>299</i> , 342
Ni ₅ P ₄ films	10	470	<i>Angew. Chem. Int. Ed.</i> 2015 , <i>54</i> , 12361
NiCo ₂ S ₄ nanowires	10	450	<i>Nanoscale</i> 2015 , <i>7</i> , 15122
Fe phosphide nanotubes	10	460	<i>Chemistry—A European Journal</i> 2015 , <i>21</i> , 18062
Co phosphorous films	10	420	<i>Angew. Chem. Int. Ed.</i> 2015 , <i>54</i> , 6251
CoO _x /N-doped Carbon	20	320	<i>J. Am. Chem. Soc.</i> , 2015 , <i>137</i> , 2688
Ni phosphorous films	10	440	<i>ChemCatChem</i> 2016 , <i>8</i> , 106
CoMn phosphide nanoparticles	10	330	<i>J. Am. Chem. Soc.</i> 2016 , <i>138</i> , 4006
Nanoporous CoFe phosphides	10	300	<i>Energy Environ. Sci.</i> 2016 , <i>9</i> , 2257
CoO _x -CoSe films	20	430	<i>J. Mater. Chem. A</i> 2016 , <i>4</i> , 10933