Supporting Information

Self-Supported Nickel-Cobalt Nanowires as Highly Efficient and Stable Electrocatalysts for Overall Water Splitting

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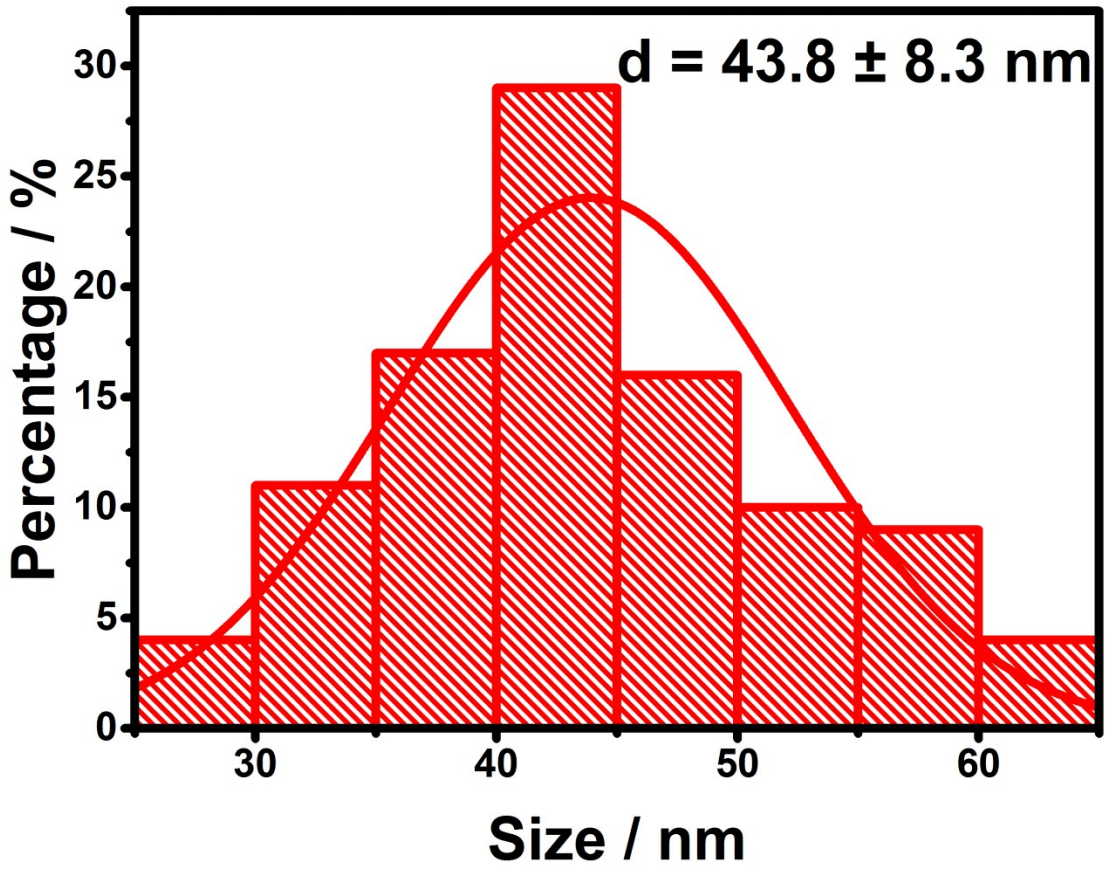

Fig.S1 Diameter distribution of $Ni_1Co_1O_2$ NWs.

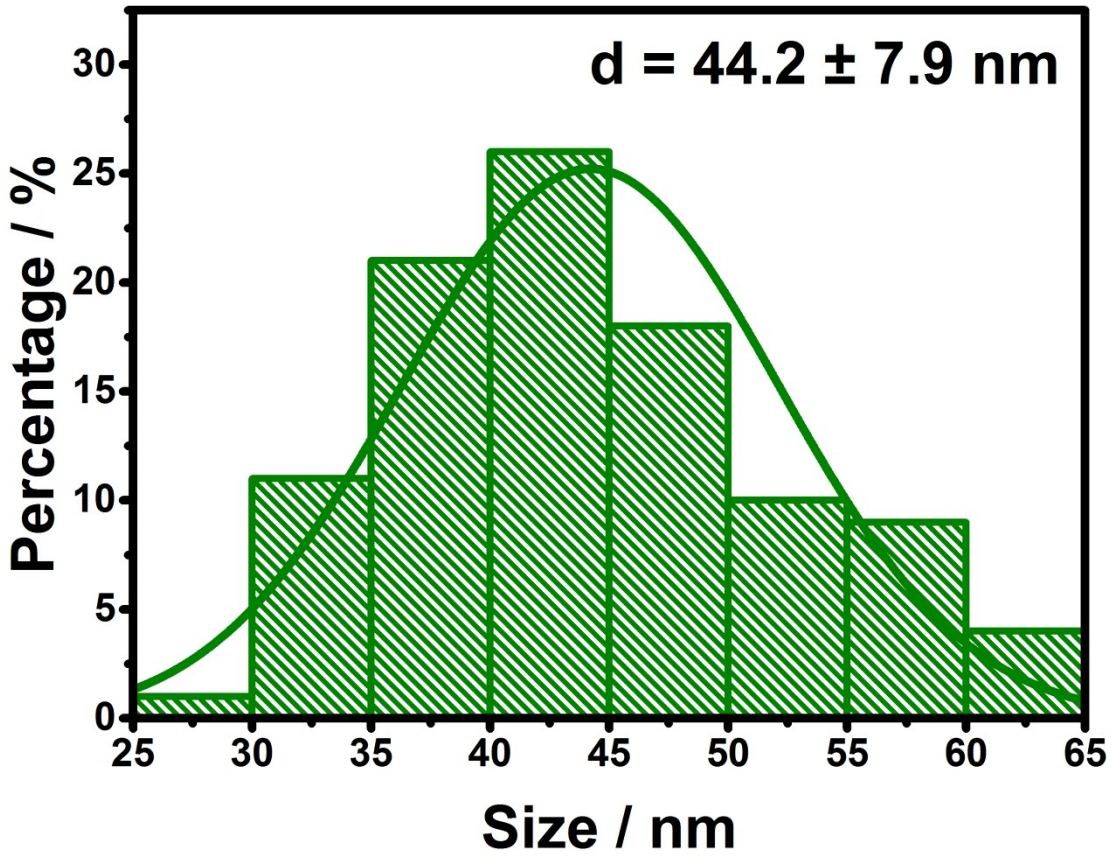

Fig.S2 Diameter distribution of Ni_1Co_1P NWs.

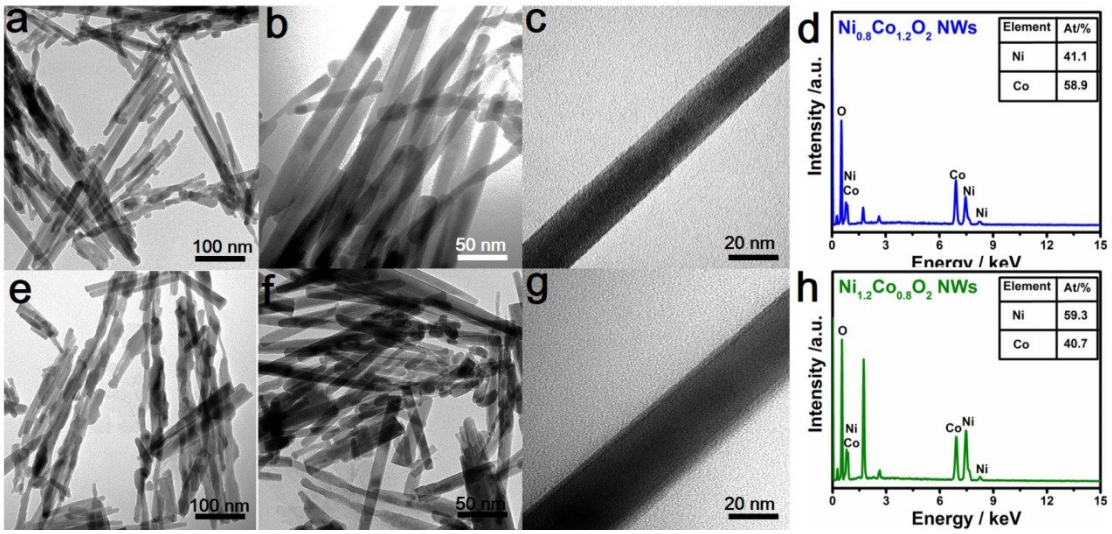

Fig.S3 Representative TEM images of (a-c) $Ni_{1.2}Co_{0.8}O_2$ NWs and (e-g) $Ni_{0.8}Co_{1.2}O_2$ NWs with different magnifications. The EDX patterns of (d) $Ni_{1.2}Co_{0.8}O_2$ NWs and (h) $Ni_{0.8}Co_{1.2}O_2$ NWs

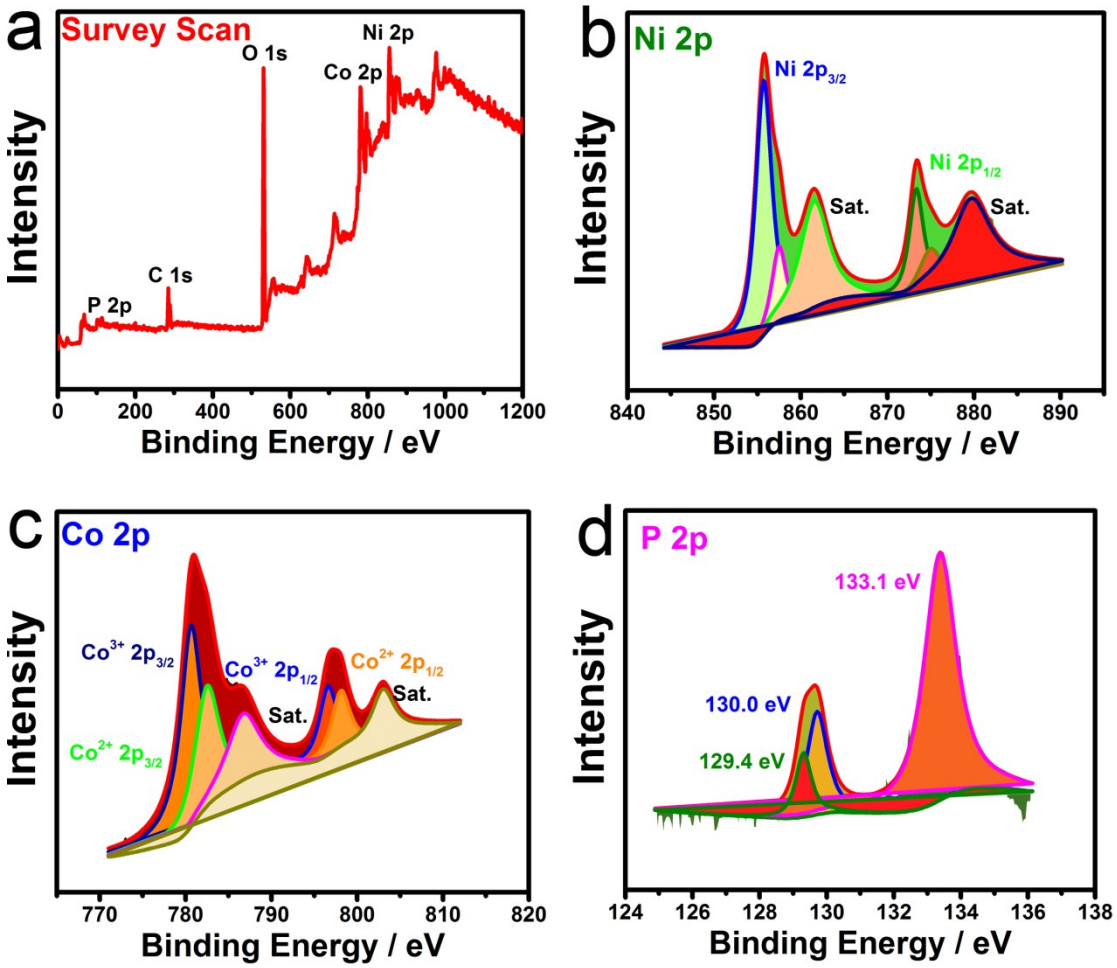

Fig.S4 XPS spectra of (a) survey scan, (b) Ni 2p, (c) Co 2p, and (d) P 2p.

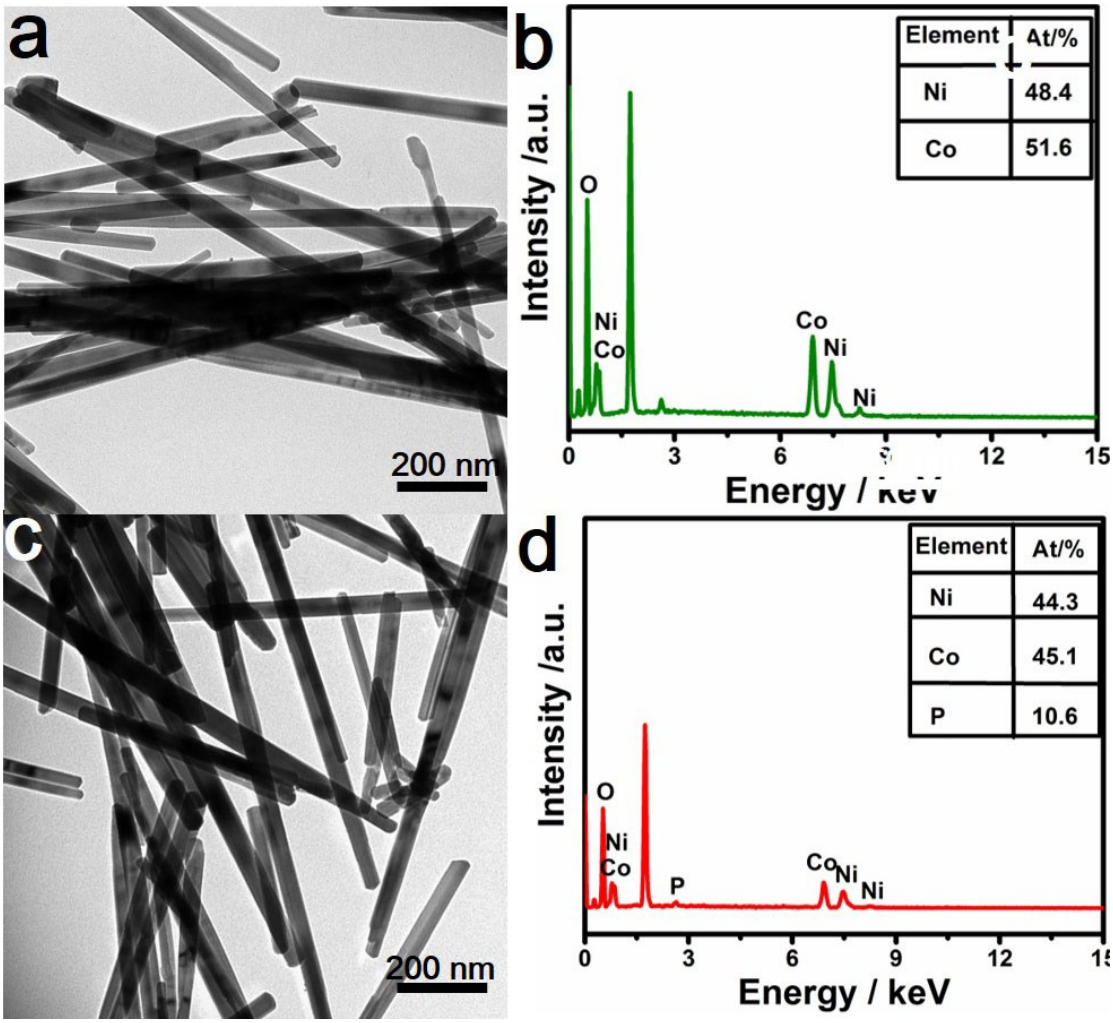

Fig.S5 TEM images and EDX patterns of (a and b) $Ni_1Co_1O_2$ NWs and (c and d) Ni_1Co_1P NWs after long-term overall water splitting test.

Table S1 Comparisons of OER activity for various electrocatalysts in alkaline condition (η: overpotential at the current density of 10 mA cm^{-2}).

Catalyst	η(mV)	Electrolyte	Reference
$Ni_1Co_1O_2$ NWs	**248**	1.0 M KOH	**This work**
(Zn)Ni-LDH/N-rGO	290	1.0 M KOH	Nanoscale 2017, 9, 12590
$Ni(OH)_2$/NiAl-6	289	1.0 M KOH	Adv. Sci. 2017, 4, 1700084
Ni_3Se_4	320	1.0 M KOH	Nanoscale 2018, 10, 5163
CoO_x-ZIF	318	1.0 M KOH	Adv. Funct. Mater. 2017, 1702546
$NiCoO_2$ NWs	303	1.0 M KOH	Electrochim. Acta 2015, 174, 26
Co_3O_4@CoO SC	430	1.0 M KOH	Nat. Commun. 2015, 6, 8
$CoSe_2$/N-doped graphene	366	0.1 M KOH	ACS Nano 2014, 8, 3970
ZnCo LDH	>330	1.0 M KOH	J. Mater. Chem. A, 2014, 2, 13250
Co@Co–Bi/Ti	327	1.0 M KOH	Nanoscale 2017, 9, 16059
Fe_3O_4 cubes	336	1.0 M KOH	ACS Energy Lett. 2018, 3, 861-868
Ni_5P_4	470	1.0 M KOH	Angew. Chem. Int. Ed. 2015, 54, 12361
CoMn LDH	324	1.0 M KOH	J. Am. Chem. Soc. 2014, 136, 16481
CoO_x-ZIF	318	1.0 M KOH	Adv. Funct. Mater. 2017, 1702546
Titanium carbide-CoBDC	410	0.1 M KOH	ACS Nano, 2017, 11, 5800
MAF-X27-OH	387	1.0 M KOH	J. Am. Chem. Soc.2016, 138, 8336
$CoSe_2$ nanosheets	320	0.1 M KOH	J. Am. Chem. Soc. 2014, 136, 15670
Ni-Co oxides layers	325	1.0 M KOH	ACS Nano 2014, 8, 9518
Ce-NiO-E	367	0.1 M KOH	Adv. Funct. Mater. 2018, 28, 1706056
Au@Co_3O_4	378	1.0 M KOH	Adv. Mater. 2014, 26, 3950
Co_3O_4@CoO SC	430	1.0 M KOH	Nat. Commun. 2015, 6, 8.
Ni-Co oxides layers	325	1.0 M KOH	ACS Nano 2014, 8, 9518

Table S2 Comparisons of HER activity for various electrocatalysts in alkaline condition (η: overpotential at the current density of 10 mA cm^{-2}).

Catalyst	η(mV)	Electrolyte	Reference
Ni_1Co_1P NWs	**101**	1.0 M KOH	**This work**
Co-Fe-P-1.7	295	1.0 M KOH	ACS Appl. Mater. Interfaces 2017, 9, 362
NiFe-LDH/NF	210	1.0 M KOH	Science 2014, 345, 1593
Amorphous MoSx	540	1.0 M KOH	Chem. Sci.2011, 2, 1262
MnNi	360	1.0 M KOH	Adv. Funct. Mater.2015, 25, 393
Ni_2P	220	1.0 M KOH	Energy Environ. Sci. 2015, 8, 2347
$Cu_{0.3}Co_{2.7}P$/NC	220	1.0 M KOH	Adv. Energy Mater. 2017, 7, 1601555
Ni_3S_2/NF	223	1.0 M KOH	J. Am. Chem. Soc.2015, 137, 14023.
Ni_5P_4on Nickel foil	150	1.0 M KOH	Angew. Chem. Int. Ed.2015, 54, 12361.
Ni_1Mn_1 porous materials	360	0.1 M KOH	Adv. Funct. Mater. 2015, 25, 393
CoP/CC	209	1.0 M KOH	J. Am. Chem. Soc. 2014, 136, 7587
NiCoP/rGO	209	1.0 M KOH	Adv. Funct. Mater. 2016, 26, 6785
$NiSe_2$ nanosheets	184	1.0 M KOH	Chem. Mater. 2015, 27, 5702
Co/N-doped carbon	260	1.0 M KOH	ACS Nano 2016, 10,684
WC nanoparticles/ CNT	137	1.0 M KOH	ACS Nano 2015, 9, 5125
Ni_3S_2/NF	223	1.0 M KOH	J. Am. Chem. Soc. 2015, 137, 14023
Co/CoP-5	193	1.0 M KOH	Adv. Energy Mater. 2017, 7, 1602355
Mo_2C nanoparticles	190	1.0 M KOH	Angew. Chem. Int. Ed. 2012, 51, 12703
Carbon paper/carbon tubes/Co-S	190	1.0 M KOH	ACS Nano 2016, 10, 2342
MoS_{2+x} nanoparticles	310	0.1 M KOH	Angew. Chem. Int. Ed. 2015, 54, 664

Table S3 Comparisons of the water splitting activities of various catalysts.

Catalyst	η @10 mA cm^{-2} (V)	Electrolyte	Reference
$Ni_1Co_1O_2$ NWs // Ni_1Co_1P NWs	**1.58**	1.0 M KOH	**This work**
$NiCo_2O_4$ // $Ni_{0.33}Co_{0.67}S_2$ NWs	1.73	1.0 M KOH	Adv. Energy Mater. 2015, 5, 1402031.
EG/Co0.85Se/NiFe-LDH	1.67	1.0 M KOH	Adv. Funct. Mater. 2016, 26, 3515
$Ni_xCo_{3-x}O_4$ // NiCo/$NiCoO_x$	1.75	1.0 M KOH	ACS Appl. Mater. Interfaces 2016, 8, 4718.
$NiFeO_x$ // NiFe-P	1.70 (20 mA cm^{-2})	1.0 M KOH	Adv. Energy Mater. 2017, 1700107.
$CoNi(OH)_x$ // NiN_x	1.67	1.0 M KOH	Adv. Energy Mater. 2016, 6, 1501661.
SNCF-NRs	1.68	1.0 M KOH	Adv. Energy Mater. 2017,1602122.
carbon fiber paper (CP) @Ni-P	1.63	1.0 M KOH	Energy Environ. Sci. 2016, 9, 478
CoS sheet	1.74	1.0 M KOH	ACS Nano 2016, 10, 2342.
$NiCo_2O_4$	1.65	1.0 M KOH	Angew. Chem. Int. Ed. 2016, 55, 14693.
$NiCo_2S_4$	1.68	1.0 M KOH	Nanoscale, 2015, 7, 15122.
CoO/MoO_x	1.72	1.0 M KOH	Chem. Eng. 2016, 4, 3743.
Co_1Mn_1CH	1.68	1.0 M KOH	J. Am. Chem. Soc. 2017, 139, 8320.
NiSe	1.63	1.0 M KOH	Angew. Chem. Int. Ed. 2015, 54, 9351.
Ni_2P	1.63	1.0 M KOH	Energy Environ. Sci. 2015, 8, 2347.
NiFe LDHs	1.70	1.0 M KOH	Science 2014, 345, 1593.
NiFe/$NiCo_2O_4$	1.67	1.0 M KOH	Adv. Funct. Mater. 2016, 26, 3515.
NiFe nanosheets/$NiCo_2O_4$ nanoflakes/NF	1.67	1.0 M KOH	Angew. Chem. Int. Ed. 2016, 55, 6702