Electronic Supplementary Information for

MOF-Derived Porous Ni_2P Nanosheets as Novel Bifunctional Electrocatalysts for Hydrogen and Oxygen Evolution Reaction

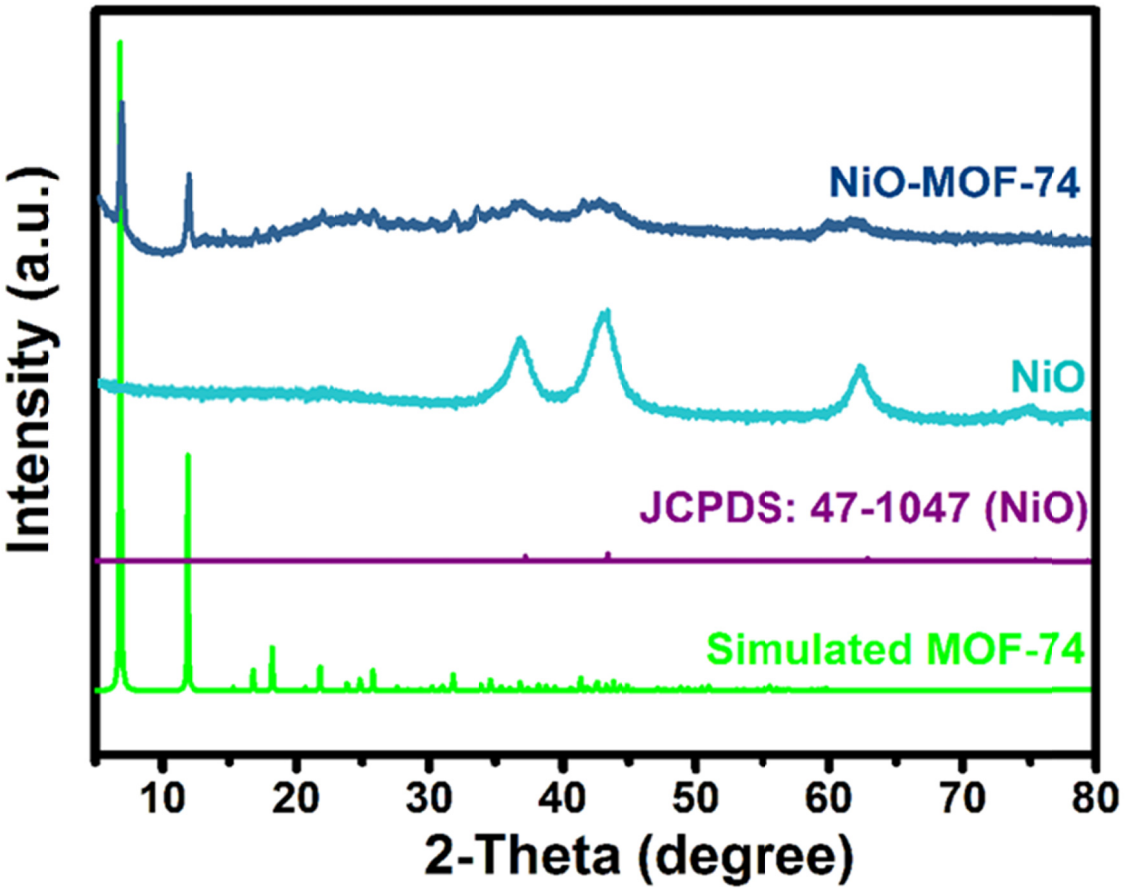

Fig. S1 XRD patterns of NiO and NiO-MOF-74 nanosheets.

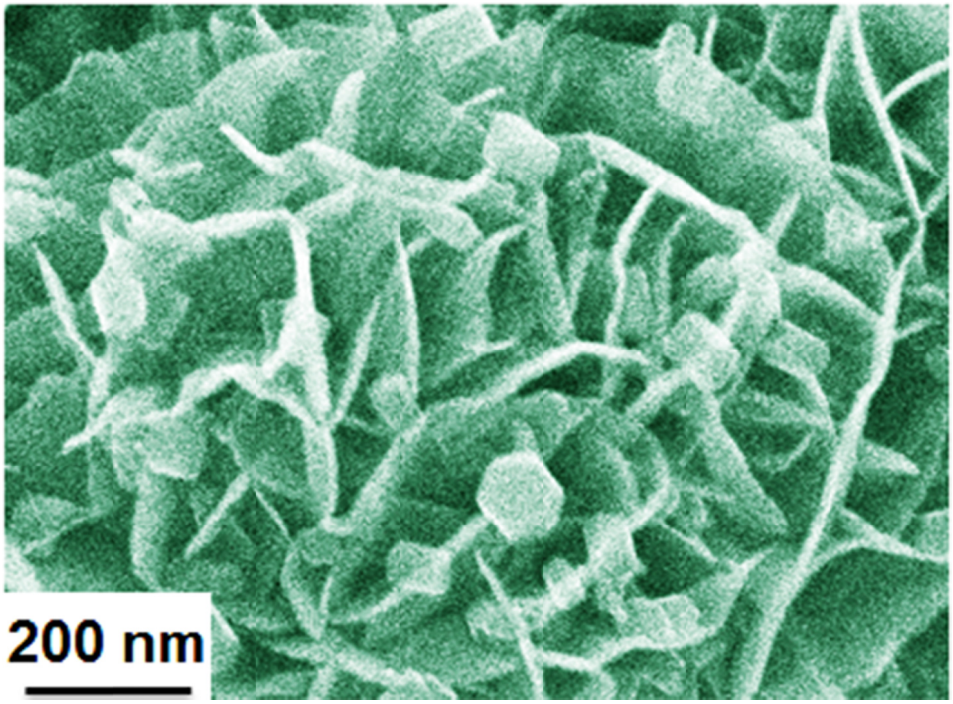

Fig. S2 SEM image of NiO-MOF-74 nanosheets.

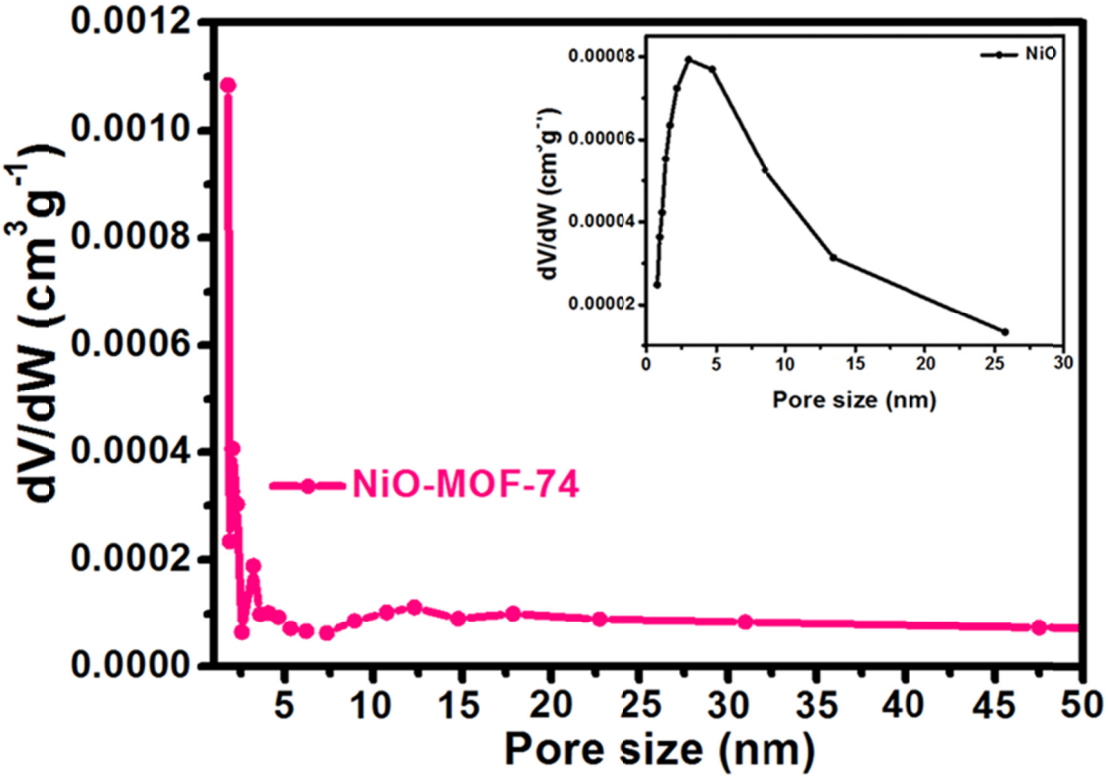

Fig. S3 Pore size distribution of NiO and NiO-MOF-74 nanosheets.

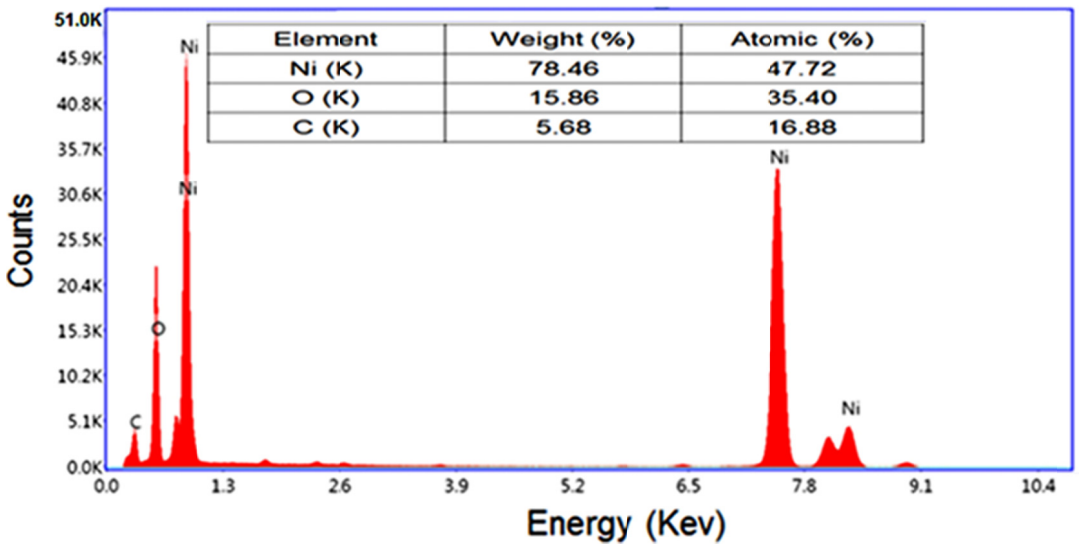

Fig. S4 TEM-EDS spectrum of the NiO-MOF-74.

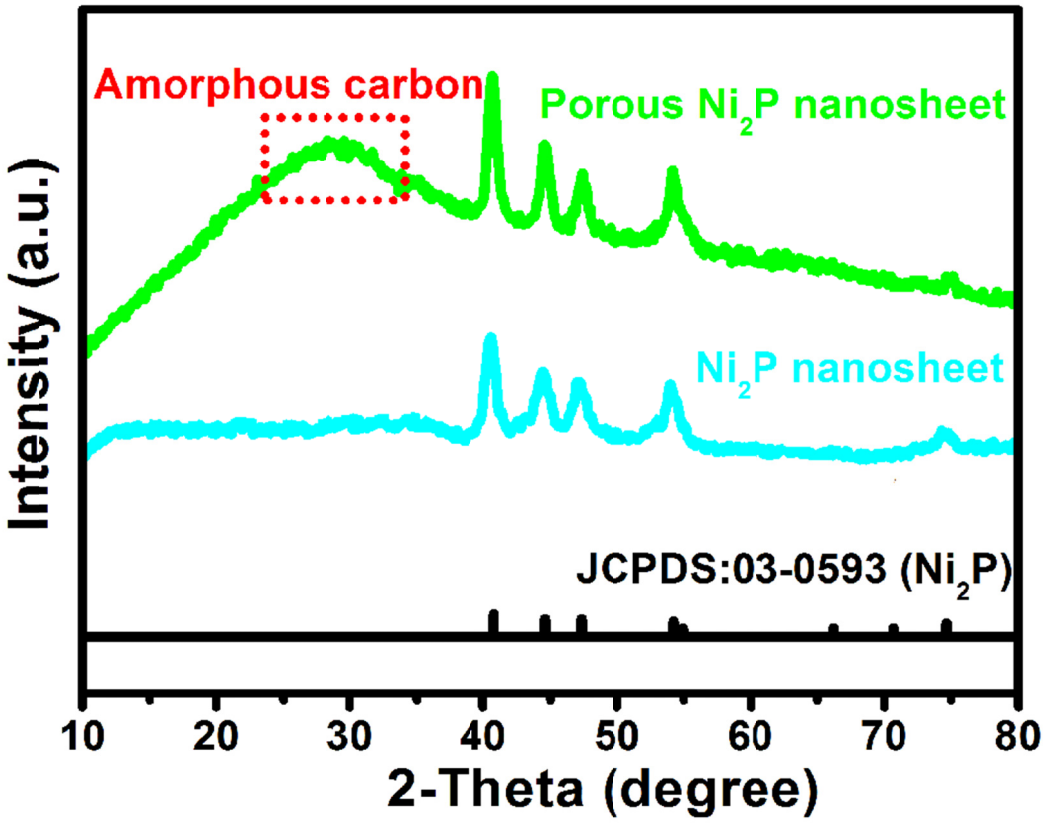

Fig. S5 XRD patterns of Ni_2P and porous Ni_2P nanosheets.

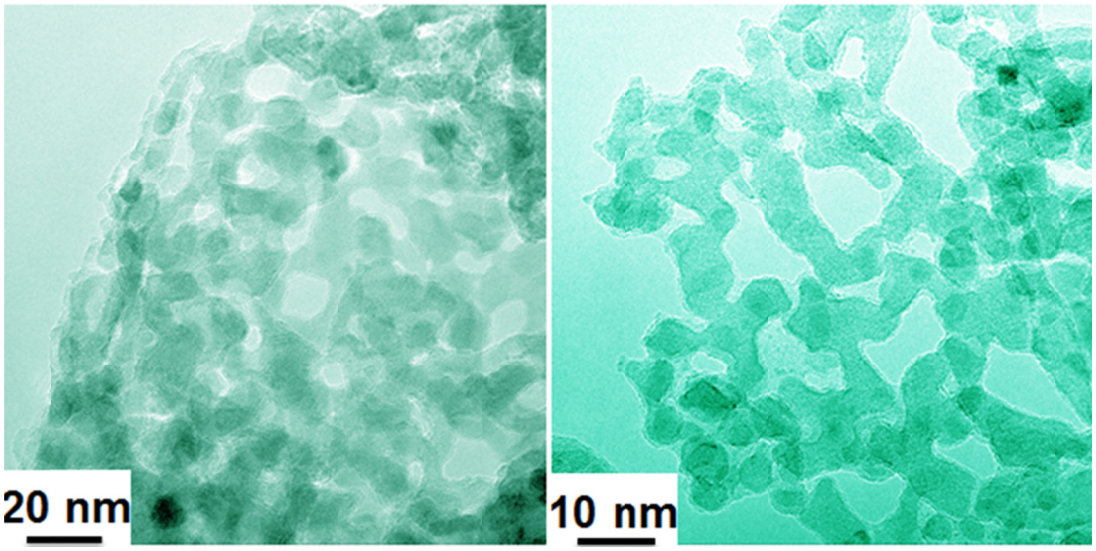

Fig. S6 High-magnified TEM images of porous Ni_2P nanosheets.

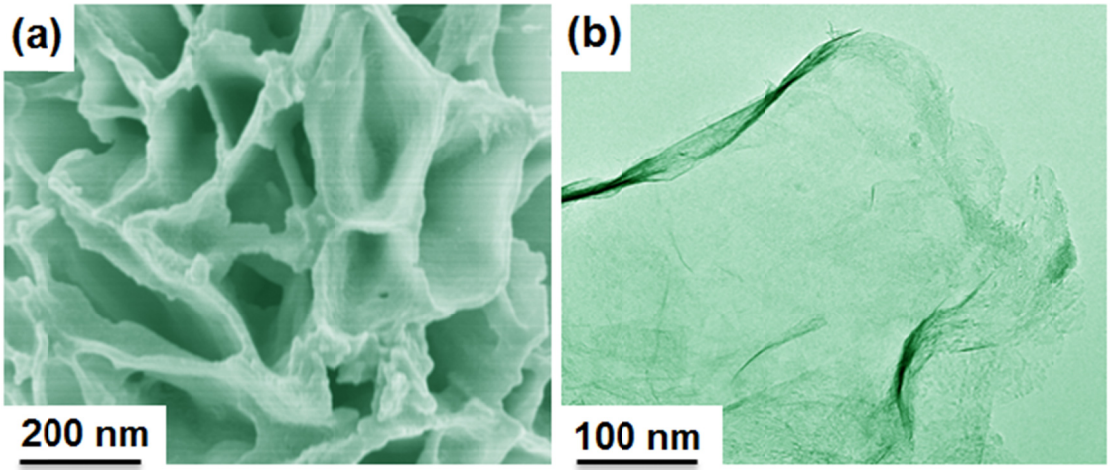

Fig. S7 (a) SEM and (b) TEM images of Ni_2P nanosheets.

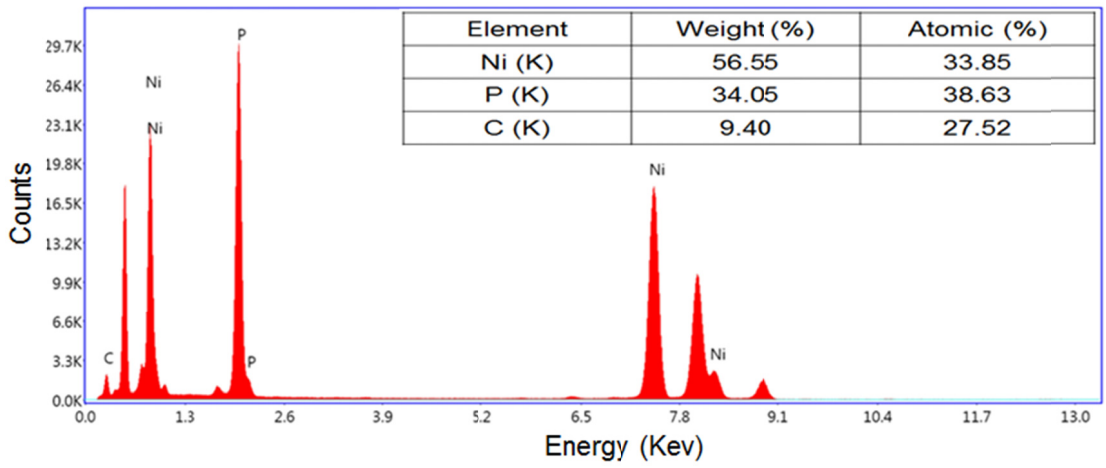

Fig. S8 TEM-EDS spectrum of the porous Ni_2P nanosheets.

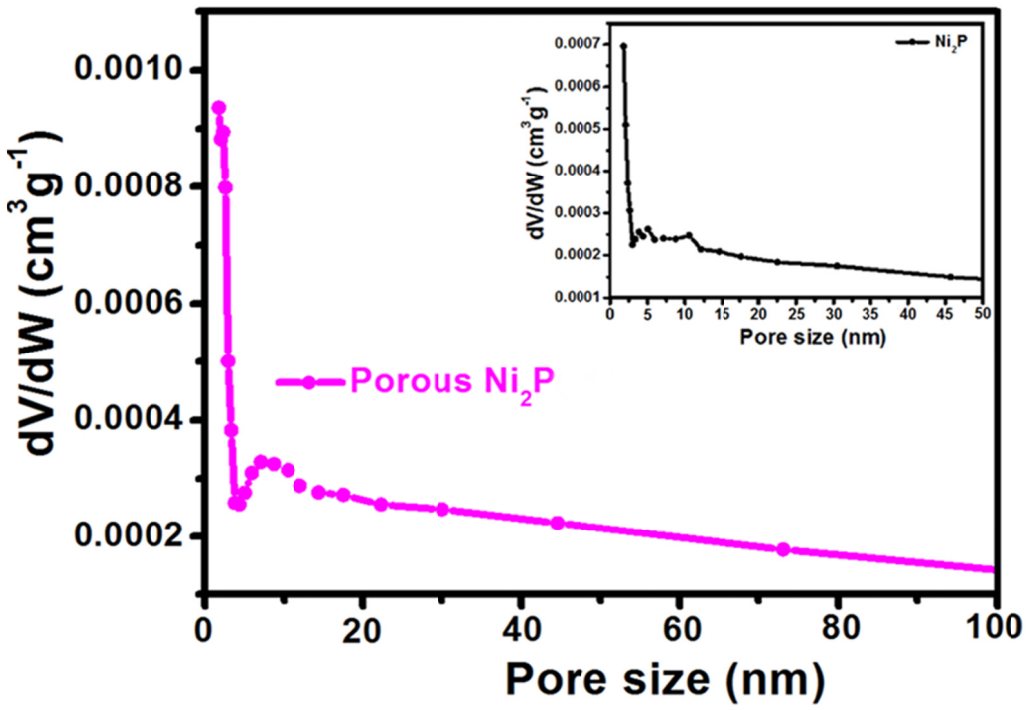

Fig. S9 Pore size distribution of the Ni_2P and porous Ni_2P nanosheets.

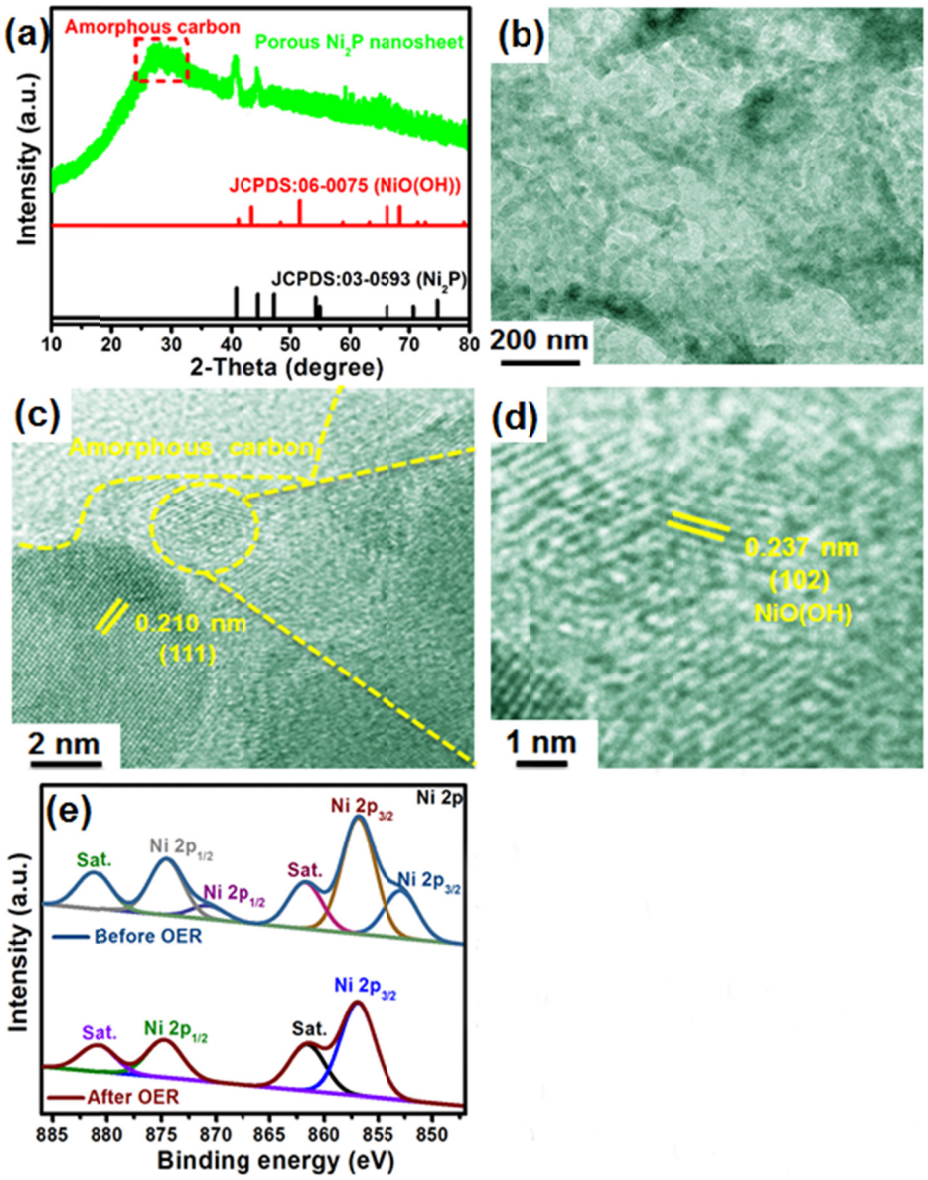

Fig. S10 (a) XRD pattern, (b) TEM image and (c,d) HRTEM images of porous Ni_2P nanosheets after 10 h OER stability test. (e) XPS signals of Ni 2p for the porous Ni_2P nanosheets after 10 h OER stability test.

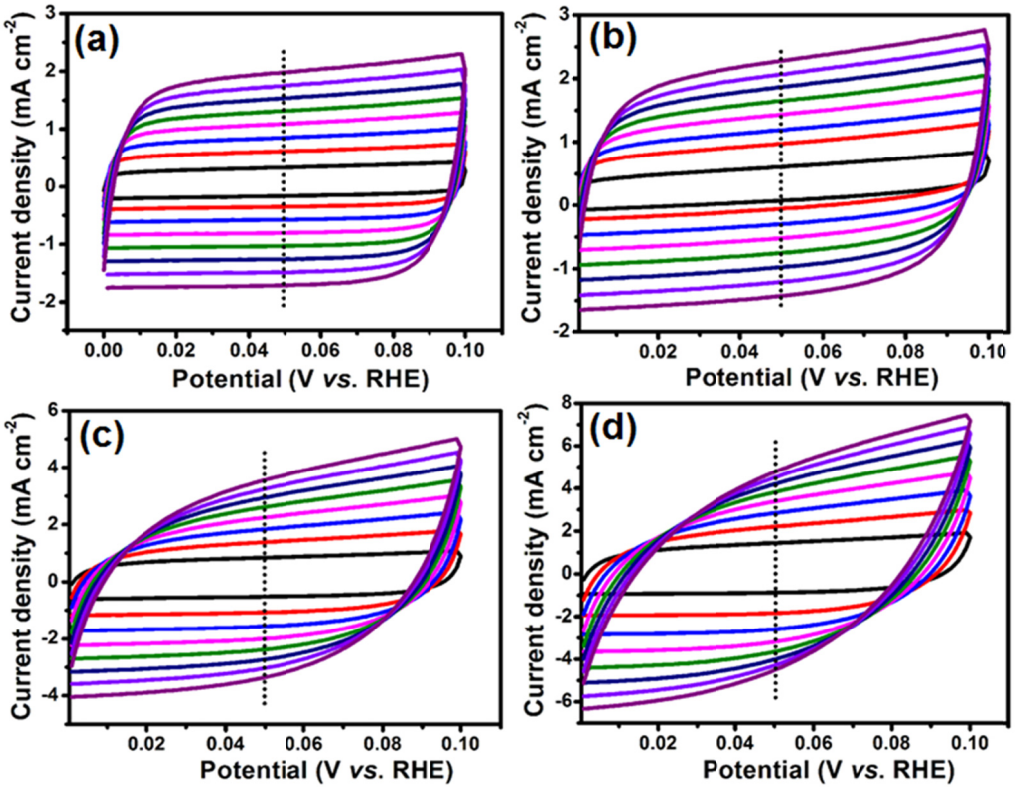

Fig. S11 Voltammograms of the (a) NiO, (b) NiO-MOF-74, (c) pristine Ni_2P and (d) porous Ni_2P nanosheets electrocatalysts at various scan rates (20-160 mV s^{-1}).

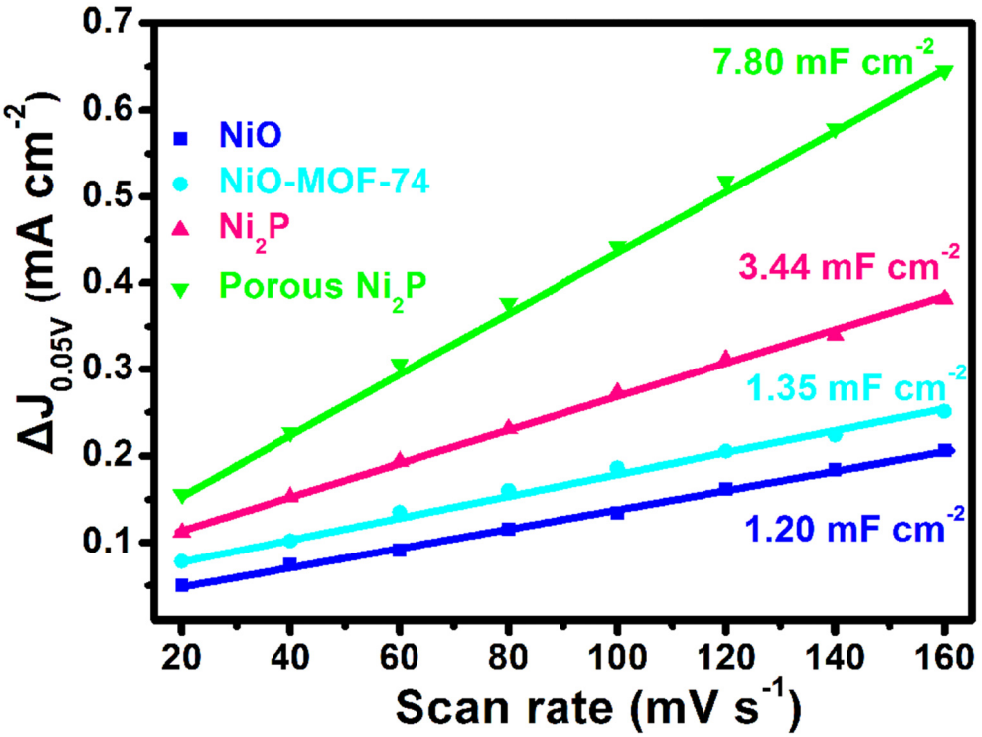

Fig. S12 Capacitive current at 0.05 V (*vs* RHE) as a function of scan rate for NiO, NiO-MOF-74, pristine Ni_2P and porous Ni_2P nanosheets.

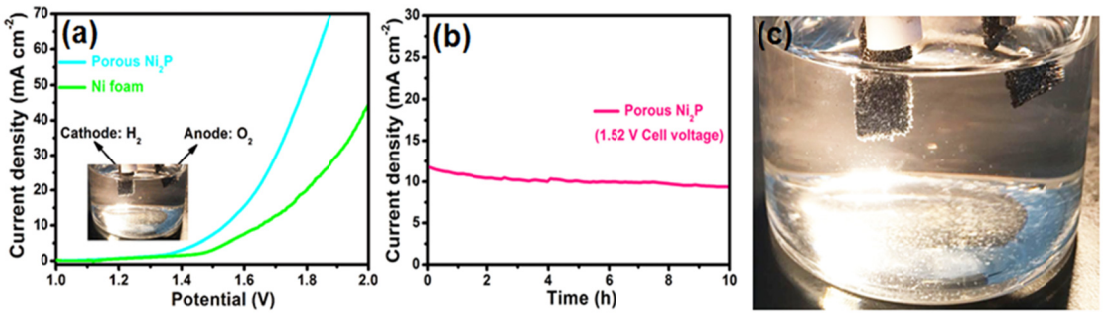

Fig. S13 (a) LSV curves of overall water splitting in a two-electrode system. The inset is the digital photo of H_2 and O_2 bubbles. (b) The stability of water splitting at a cell voltage of 1.52 V for 10 h. (c) Enlarged digital photo of H_2 and O_2 bubbles.

Table S1 Summary of the HER and OER performance using Ni_2P nanostructures as electrocatalysts.

catalyst	**Overpotential** (**10 mA cm^{-2}**)	**Tafel Slope** (**mV dec^{-1}**)	**Electrolyte**	**Reference**
MOF derived porous Ni_2P NS	**168 (HER) 320 (OER)**	**63 (HER) 105 (OER)**	**1.0 M KOH 1.0 M KOH**	**Our work**
MOF derived Ni_2P/CoP NP	184 (HER) 360 (OER)	67 (HER) 72 (OER)	0.5 M H_2SO_4 0.1 M KOH	*ACS Appl. Mater. Interfaces* 2017, **9**, 23222
MOF derived Ni_2P polyhedrons	310 (HER)	73 (HER)	0.5 M H_2SO_4	*ACS Appl. Mater. Interfaces* 2017, **9**, 11642
Ni–Fe–P porous Nanorods	233 (HER) 256 (OER)	101.2 (HER) 72.6 (OER)	1.0 M KOH 1.0 M KOH	*J. Mater. Chem. A* 2017, **5**, 2496
MOF derived Ni/Ni_2P/Mo_2C@C	223 (HER) 368 (OER)	66 (HER) 75 (OER)	0.5 M H_2SO_4 1.0 M KOH	*J. Mater. Chem. A* 2018, **6**, 5789
Ni_2P–CeO_2 nanosheet	131 (HER)	87 (HER)	1.0 M KOH	*Inorg. Chem.* 2018, **57**, 548
NiS/Ni_2P Heterostructure	158 (HER) 335 (OER)	78.1 (HER) 101.1 (OER)	0.5 M H_2SO_4 1.0 M KOH	*ACS Appl. Mater. Interfaces* 2018, **10**, 4689
MOF derived Ni_2P nanoparticle	380 (HER)	270 (HER)	0.5 M H_2SO_4	*RSC Adv.* 2015, **5**, 10290

Porous Ni_2P Superstructure	221 (HER) 400 (OER)	91 (HER) 132 (OER)	1.0 M KOH 1.0 M KOH	*ACS Catal.* 2016, **6**, 714
Ni_2P nanosheet	185 (HER)	138 (HER)	0.5 M H_2SO_4	*Chem. Commun.,* 2017, **53**, 11048
Ni_2P Hollow Microsphere	214 (HER) 359 (OER)	125.4 (HER) 71.7 (OER)	1.0 M KOH 1.0 M KOH	*Chem. Mater.* 2017, **29**, 8539