Electronic Supplementary Information

Synthetic method

The nickel foam (denoted as NF) was cut into round disks of 14 mm in diameter and washed with absolute ethanol and 5 wt.% HCl to remove oil and oxide film on the surface, respectively. The amorphous Ni–P (denoted as aNi-P) alloy was prepared via the electroless plating in the bath. The composition and crafts were as described in **Table S1.** Before the electroless plating, the bath was heated up to 90 ^{o}C and revised to obtain the desirable pH with the proper amount of NH_4OH (1:1 by volume). Subsequently, the as-prepared NF was put into the bath and then lots of bubbles appeared, indicating the starting of electroless plating. The plating time was carried for 60 minutes under the temperature of 90 ^{o}C. The obtained aNi–P alloy was washed with deionized water several times and dried with strong blow. Finally, the aNi–P alloy was annealed for one hour under Ar atmosphere for crystalline transformation. The crystal Ni-P (denoted as cNi-P) alloy coating was achieved.

Material characterizations

X-ray diffraction (XRD) patterns of the as-prepared materials were collected on a D/max-γB X-ray diffractometer (Rigaku, Japan) using Cu Kα radiation (λ=1.54178). The diffraction angle was scanned from 35° to 80° at the scanning speed of 0.02 °s^{-1}. The field-emission scanning electron microscopy (SU8000 Series) with EDS was used for morphology examination and composition analysis. X-ray photoelectron spectroscopy (XPS) was used to analyze the samples on PHI 5700 ESCA System (USA) using monochromatized AlKa radiation at 1486.6 eV.

Electrochemical measurements

The round nickel foam coated amorphous Ni–P alloy and crystal Ni–P alloy as the work electrode were tested in coin-type cell. The coin-type cell was assembled with a Li foil as the counter electrode, a polypropylene micro-porous film (Celgard 2400) as separator, and EC/DMC/DEC-based (1:1:1 by weight) electrolytes containing 1 M of $LiPF_6$ in a glove box filled with pure Ar. Cyclic voltammetry (CV) measurements (2.5~4.0 V and 0.01~4.5 V, 0.1 mVs^{-1}) were performed on CHI 630B electrochemical workstation. All the tests were performed at room temperature (25 °C).

Table S1. Composition of the Ni electroless baths

Constituents of the bath(g/L)	Concentration
$NiSO_4 \cdot 6H_2O$ (g/L)	28
$NaH_2PO_2 \cdot H_2O$ (g/L)	32
CH_3COONa (g/L)	20
$Na_3C_6H_5O_7 \cdot 2H_2O$ (g/L)	25
Additives (ml/L)	Thiourea 1 μm/L, Pb^{2+} 1 ml/L, Cd^{2+} 1 ml/L
NH_4OH (25%)	the amount needed to obtain the desirable pH value
Operating conditions	
pH	4.2~4.8
Temperature(^oC)	80~90
Plating time (min)	60

Electronic Supplementary Material (ESI) for RSC Advances

Electronic Supplementary Information

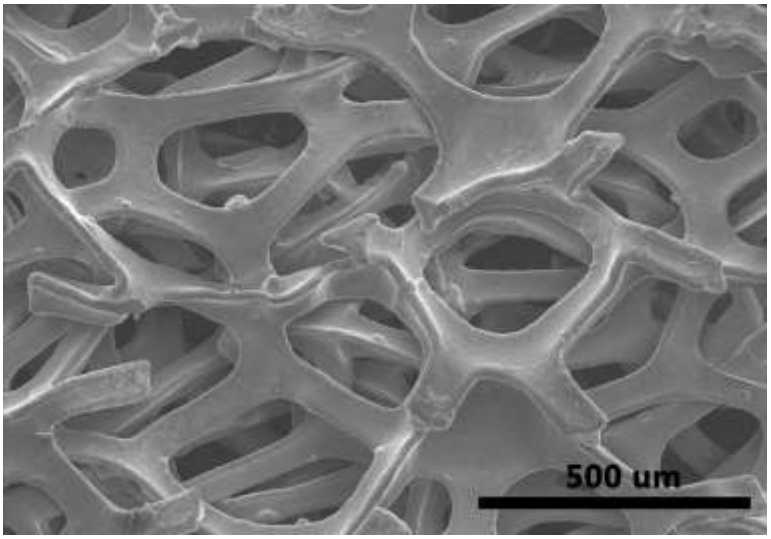

Fig. S1. SEM images of the pure nickel foam

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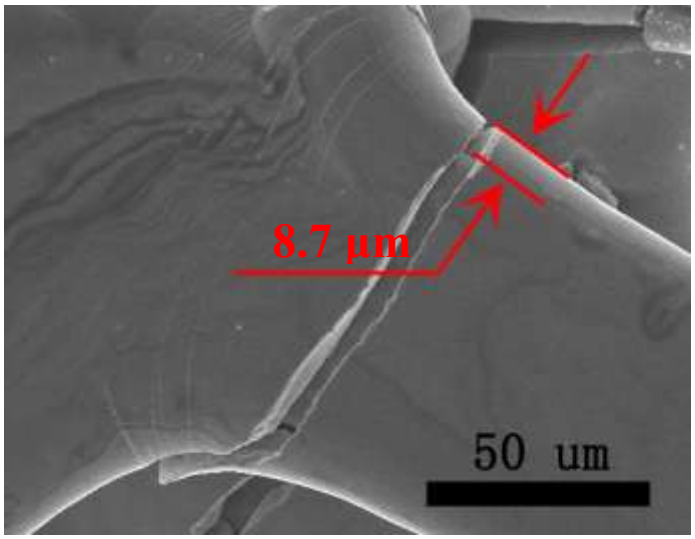

Fig. S2. The SEM image of the amorphous Ni–P alloy with the physical extrusion.

Electronic Supplementary Information

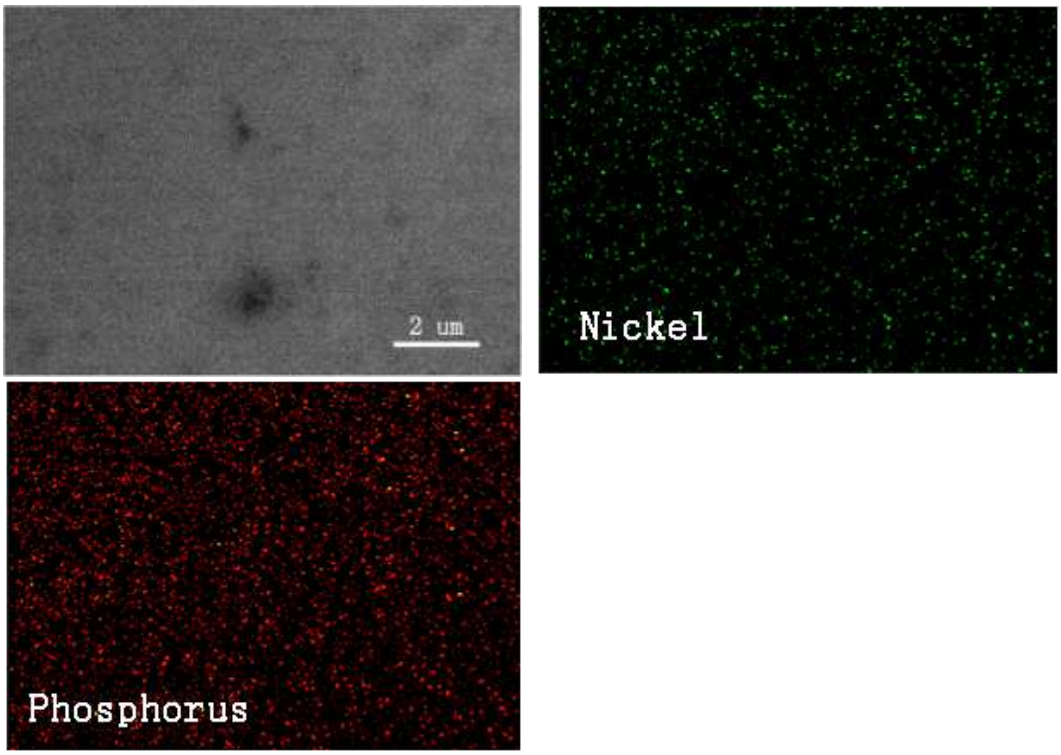

Fig. S3. The element mapping of amorphous Ni-P alloy.

Electronic Supplementary Information

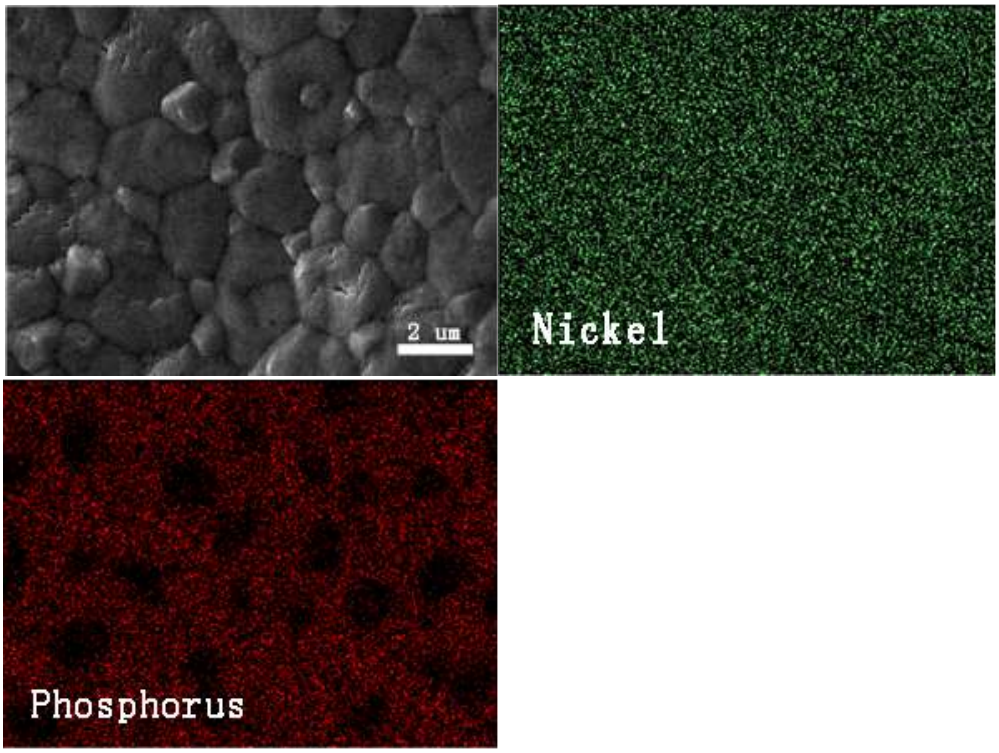

Fig. S4. The element mapping of crystal Ni-P alloy.