Electronic Supplementary Material (ESI) for Nanoscale.

3D Porous Ni-Cu Alloy Film for High-performance Hydrazine Electrooxidation

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Supporting information

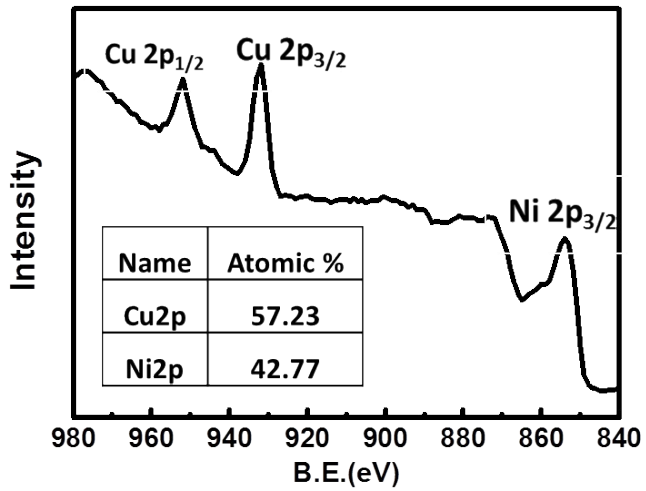

Fig. S1 Cu 2p1/2, Cu 2p3/2 and Ni 2p3/2 orbital binding energy regions in the full XPS spectrum of the optimal Ni–Cu alloy film and the calculated Cu/Ni atomic ratio of 1.34/1.

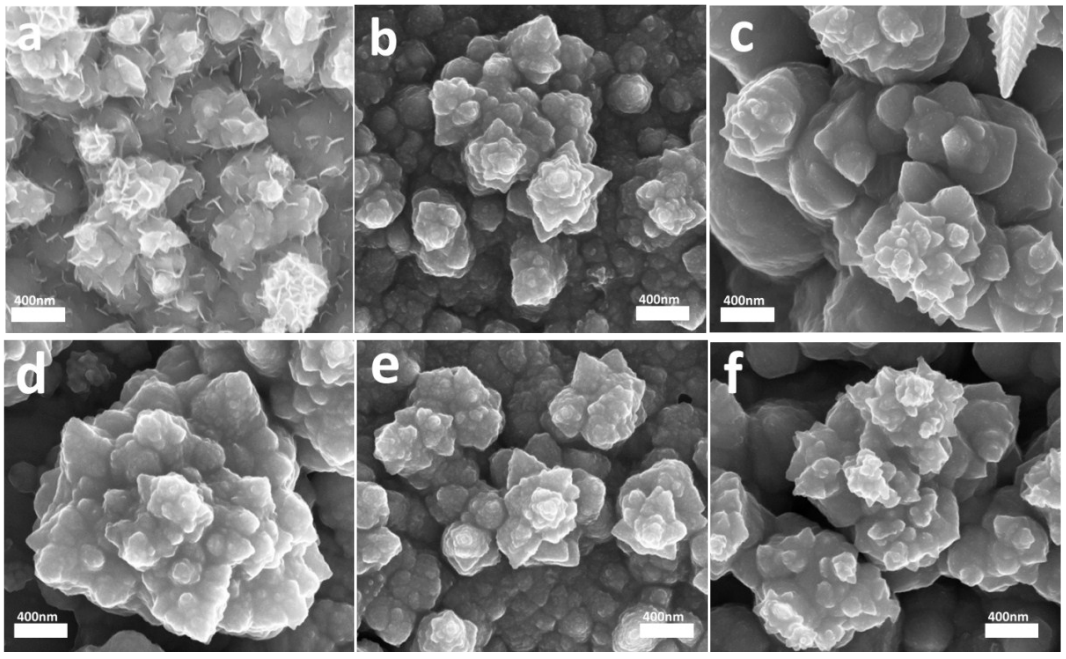

Fig. S2 SEM images of the Ni-Cu alloy films prepared at the different electrode position potentials for the same time of 400 s: a) -1.2 V; b) -1.5 V; c) -1.9 V and prepared at the same potential of -1.8 V for the different electrode position time: d) 100 s; e) 200 s; f) 600 s.

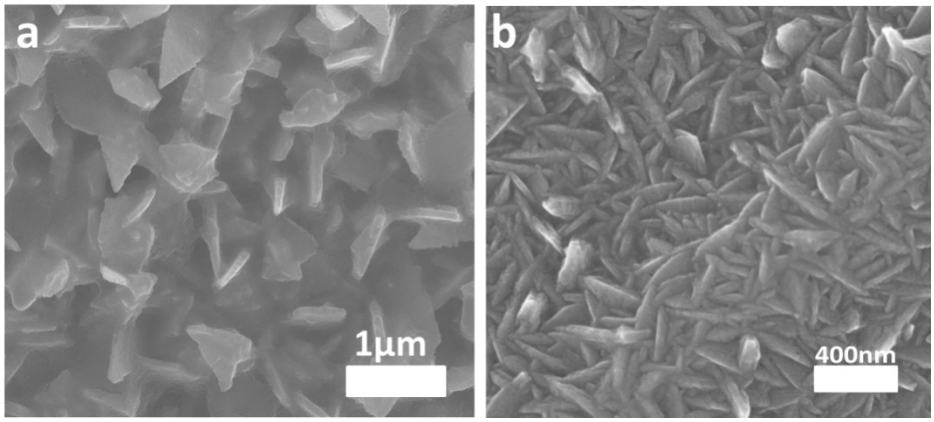

Fig. S3 SEM images of control samples: a) Cu array film; b) Ni array film.

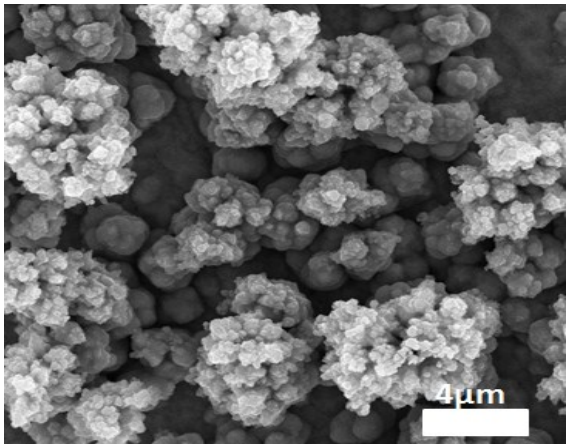

Fig. S4 SEM image of the optimal Ni-Cu alloy film after a long time stability testing.

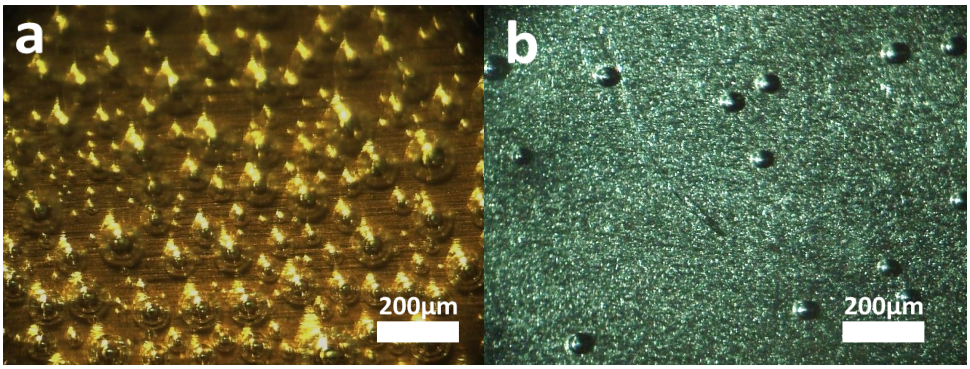

Fig. S5 The digital images showing the bubble generation behaviors on a) Cu foil and b) Ni foil.

Table S1 HzOR performance comparison of the Ni-based alloys in our work and some references.

Sample	Conditions	Current density	Stability	Ref.
Highly metallic Ni NPs	0.1M N_2H_4, 0.1M NaOH	608 A g^{-1} at 0.1V (vs. RHE)	—	31
$Ni_{85}Fe_{15}$ /PEI–MoS_2	0.1M N_2H_4, 0.15M NaOH, 60℃	520 A g^{-1} at -0.2V (vs. SCE)	~30%	29
$Ni_{0.33}Zn_{0.67}$	5% N_2H_4, 1M KOH, 60℃	500 A g^{-1} at 0.35V (vs. RHE)	—	22
$Ni_{55}Fe_{45}$	0.1M N_2H_4, 0.015M KOH, 60℃	350 A g^{-1} at -0.4V (vs. RHE)	—	33
Ni-Mn(Fe, Zn) /C	1M N_2H_4, 1M KOH, 60℃	200 A g^{-1} at 0.2V (vs. RHE)	—	34
$Ni_{0.4}La_{0.6}$ /C	1M N_2H_4, 1M KOH, 60℃	88.6 A g^{-1} at 0.22V (vs. RHE)	—	30
Ni-Zr	2M N_2H_4, 1M NaOH	165 mA cm^{-2} at -0.8V (vs. NHE)	—	28
$Ni_{80}Fe_{20}$ /PEI-$rGO_{10:1}$	0.1M N_2H_4, 0.15M NaOH	57 mA cm^{-2} at 0.5V (vs. SCE)	~17%	32
Ni_1Co_1	0.1M N_2H_4, 1M KOH, 60℃	36 mA cm^{-2} at 0.1V (vs. RHE)	39%	35
$Ni_{0.87}Zn_{0.13}$ /C	0.1M N_2H_4, 1M KOH	5 mA cm^{-2} at 0.35V (vs. RHE)	—	23
$Ni_{0.43}Cu_{0.57}$	0.1M N_2H_4, 3M NaOH	300 mA cm^{-2} at -0.6V (vs. SCE)	80%	This work