Dual functioning porous catalysts: Robust electro-oxidation of small organic molecules and water electrolysis at bimetallic Ni/Cu foam

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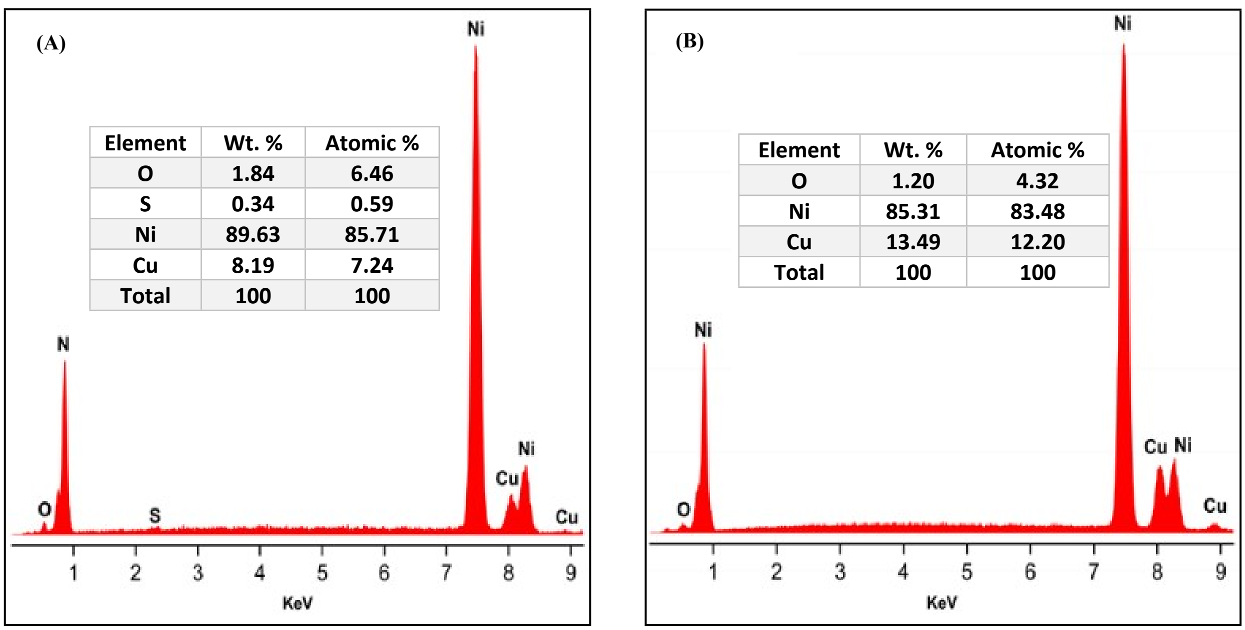

(A)

Element	Wt. %	Atomic %
O	1.84	6.46
S	0.34	0.59
Ni	89.63	85.71
Cu	8.19	7.24
Total	100	100

(B)

Element	Wt. %	Atomic %
O	1.20	4.32
Ni	85.31	83.48
Cu	13.49	12.20
Total	100	100

Figure S1: The EDS analyses of (A) Ni foam, and (B) Ni/Cu foam.

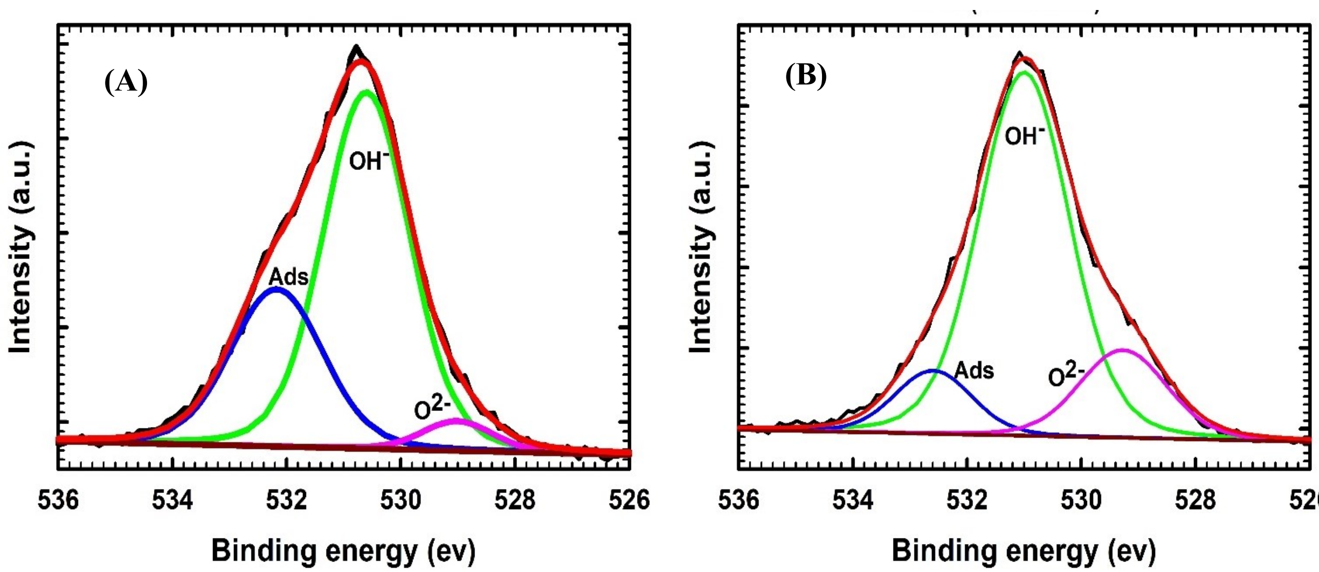

Figure S2: XPS spectra of O1s for the Ni foam (A) and the Ni/Cu foam (B), respectively.

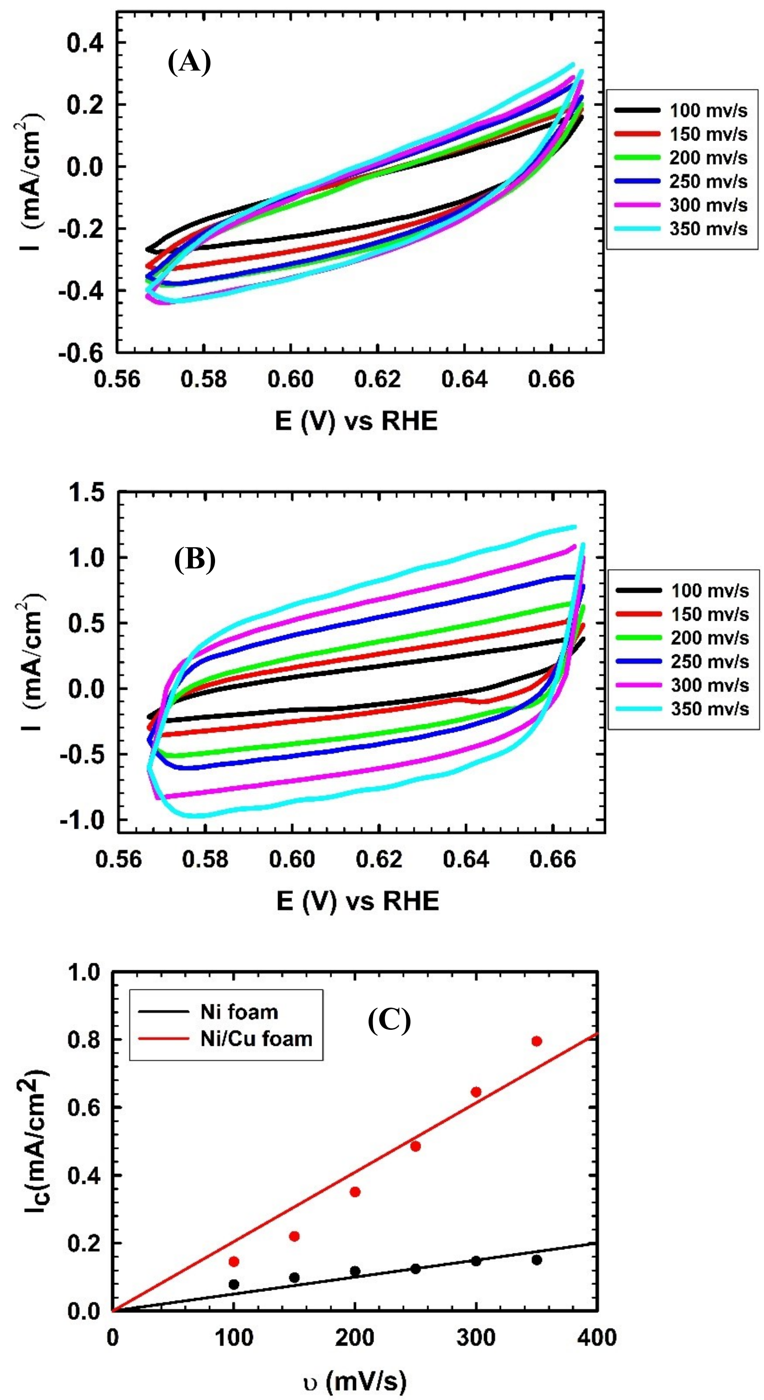

Figure S3: CVs of: (A) Ni foam, and (B) Ni/Cu foam measured in 1 M KOH solution at various potential scan rates from 100 to 350 mV s^{-1}. (C) The relation between the capacitive current densities (I_c) recorded at 0.62 V and scan rates (υ) for the Ni foam (black line), and the Ni/ Cu foam (red line).

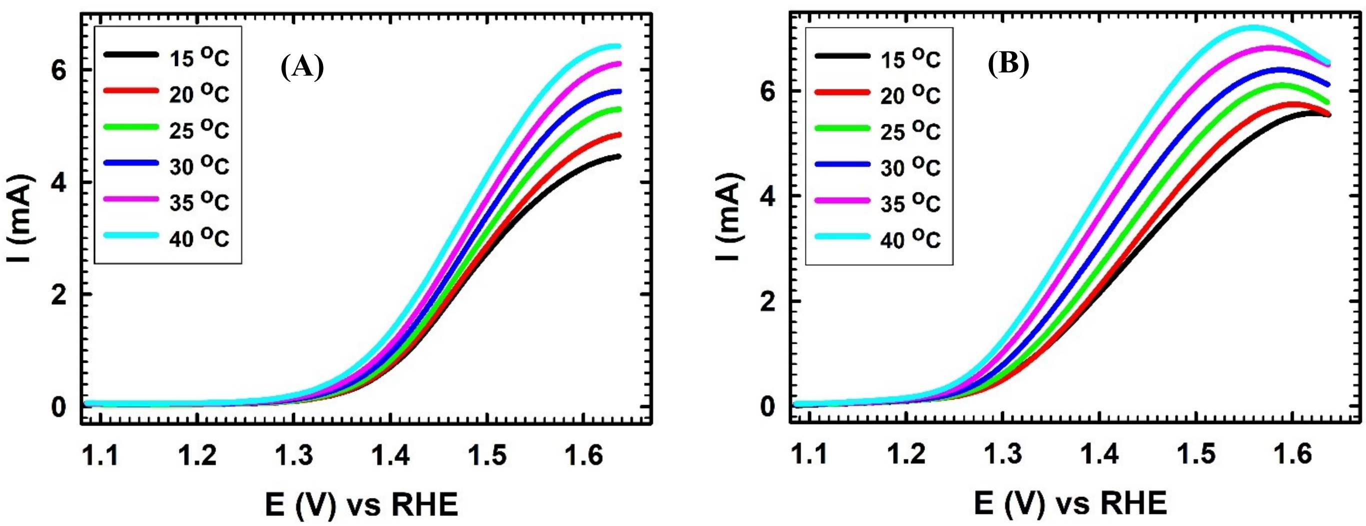

Figure S4: : LSVs recorded at different temperatures for GOR at Ni foam (A), and Ni/Cu foam (B) carried out in 0.3 M KOH solution containing 0.1 M glycerol.

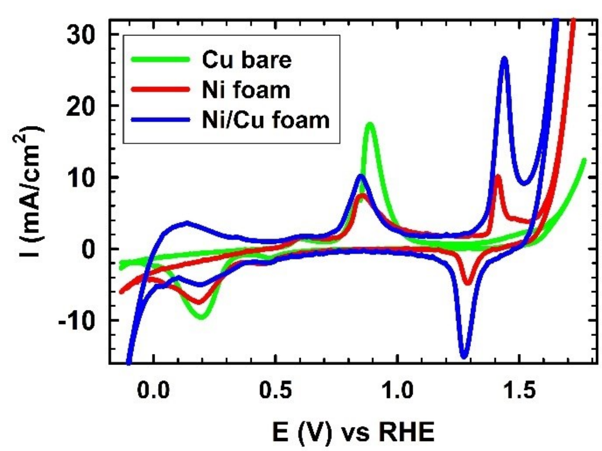

Figure S5: CVs for the Cu bare electrode (green line), Ni foam (red line), and Ni/Cu foam (blue line) carried out in 1 M KOH with potential scan rate of 10 m V s^{-1}.

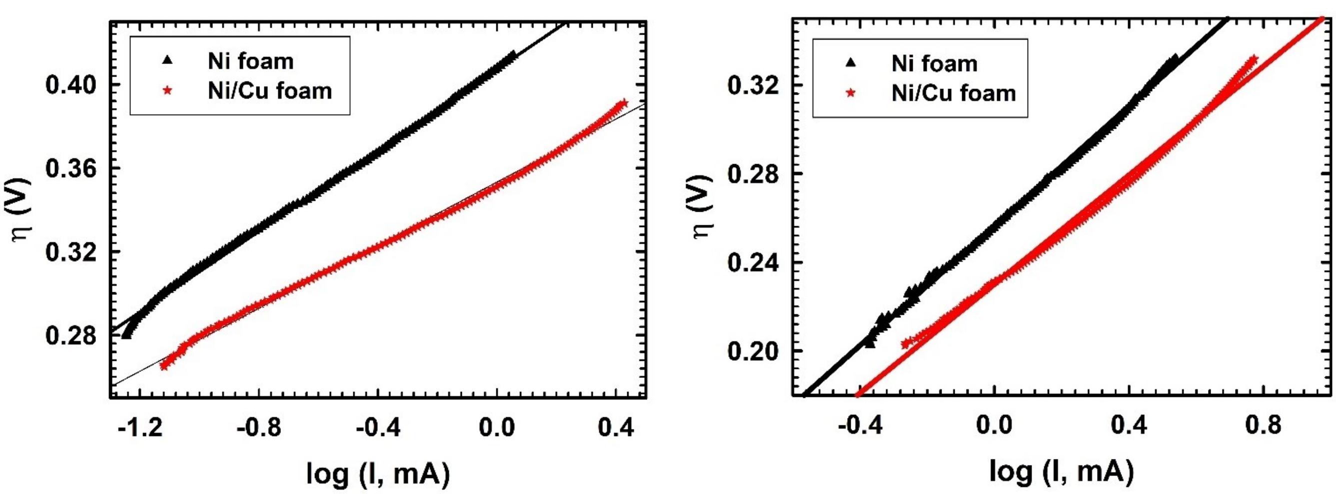

Figure S6: Tafel plots for Ni foam (black line), and Ni/Cu foam (red line) during OER (A), and HER (B) carried out in an aqueous solution of 1 M KOH at a potential scan rate of 0.1 mV s^{-1}.

(A)

(B)

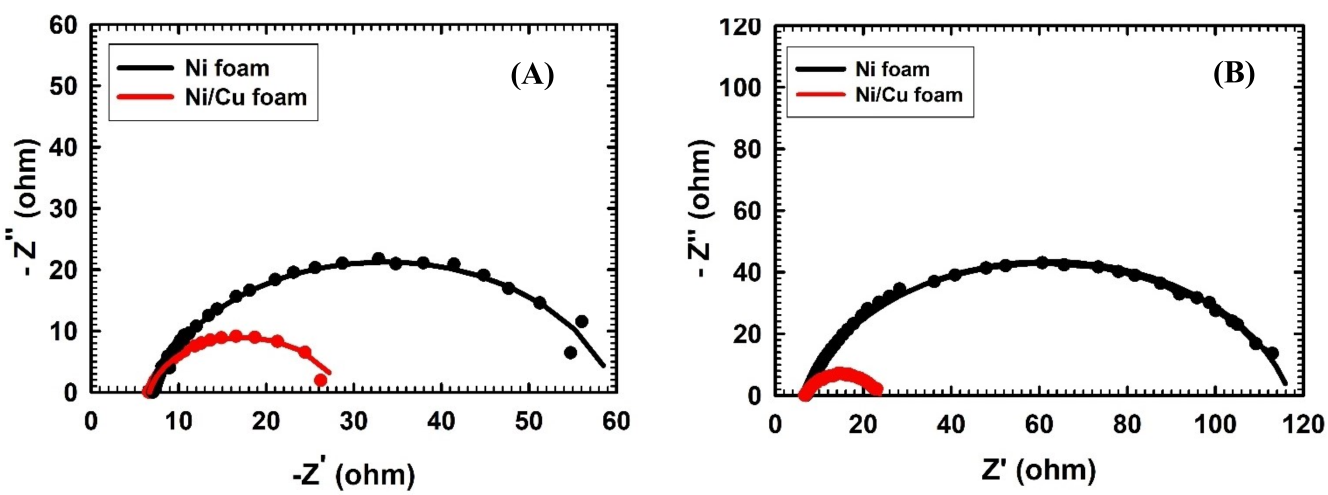

Figure S7: Nyquist plots during OER at 370 mV (A), and HER at -80 mV (B) for the Ni foam (black line) and Ni/Cu foam (red line) measured in 1 M KOH solution.

Table S1: Comparison of the HER activity for several catalysts reported in recent years.

Catalyst	η @ 10 mA/cm^2 (mV)	Reference
Ni/Cu foam	**80**	**This work**
U-CNT-900	**255**	1
Co-NCNT/CC[a]	**180**	2
CoOx/CN	**270**	3
NiS_2/CC[a]	**149**	4
Ni_3S_2/NF[a]	**123**	
MoC_x nano-octahedrons	**150**	5

Ni_2P nanoparticles	**230**	6
WP_2 submicroparticles	**153**	7
CoP/CC[a]	**209**	8
WP NA/CC[a]	**150**	9
$NiMoO_4$-$Ni(OH)_2$/NF	**93**	10
NiFe LDH-NS@DG10	**300**	11
$Ni(OH)_2$@Ni/CC	**68**	12
NiSe–$Ni_{0.85}Se$/CP	**101**	13
FNHNs/NF	**140**	14
Fe–Ni_3C-2%	**178**	14
NiMoN-550	**89**	15
CoNi-OOH-30(40)	**210**	16
NiFeCo LDH/NF	**108**	17

Table S2: Comparison of the UOR activity for several recently reported catalysts.

Catalyst	Potential @ 10 mA/cm^2 (V vs· RHE)	Reference
Ni/Cu foam	**1.38**	**This work**
NF/NiMoO-Ar	**1.37**	18
Ni_3N NA/CC	**1.35**	19
Ni_2P/NF	**1.37**	20
$Ni(OH)_2$ nanotube-NF	**1.41**	21
NiO nanosheet array	**1.38**	22
$NiMoO_4$-$Ni(OH)_2$/NF	**1.34**	10

ERGO-Ni	**1.45**	[23]
NiCo alloy	**1.53**	[24]
NiMo sheet array	**1.37**	[25]
L-MnO_2	**1.37**	[26]
$Ni(OH)_2$ nanocube	**1.55**	[27]
NiFeCo LDH/NF	**1.35**	[17]
$Ni(OH)_2$ nanosheets	**1.52**	[28]
$Fe_{11.1\%}Ni_3S_2$/Ni Foam	**1.40**	[29]

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