Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

One-step fabrication of laser induced forward transfer graphene/Cu_xO nanocomposite based electrocatalyst to promote hydrogen evolution reaction

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Supporting Figures

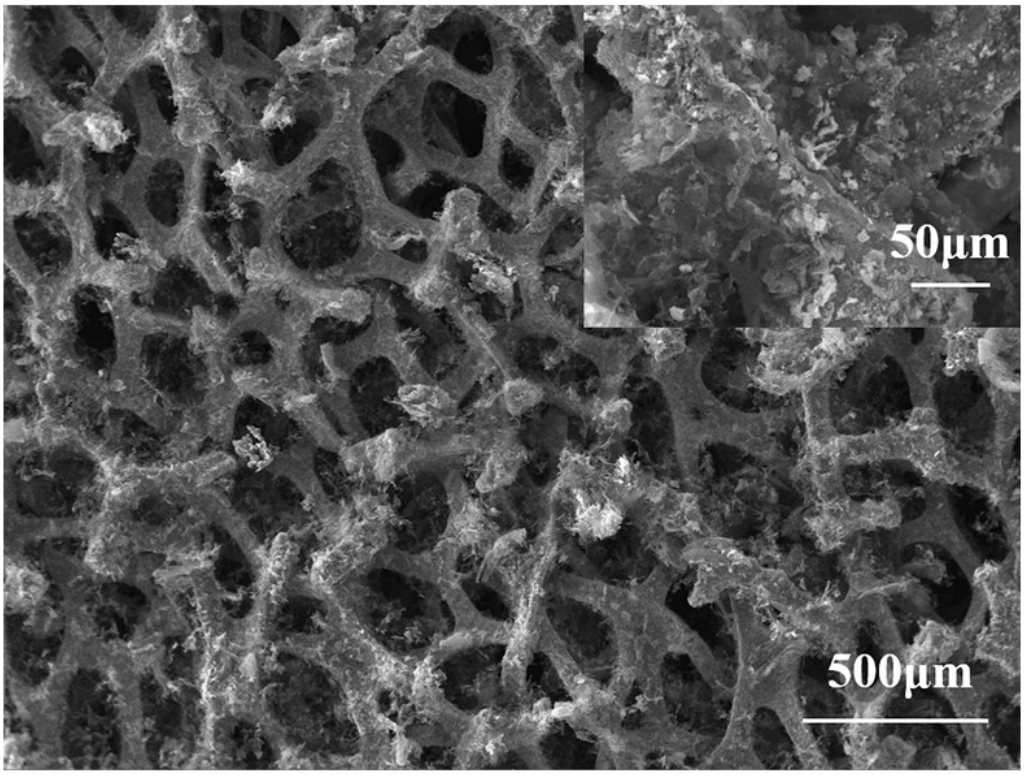

Figure S1. SEM images of the LIFT graphene/Cu_xO @Ni foam.

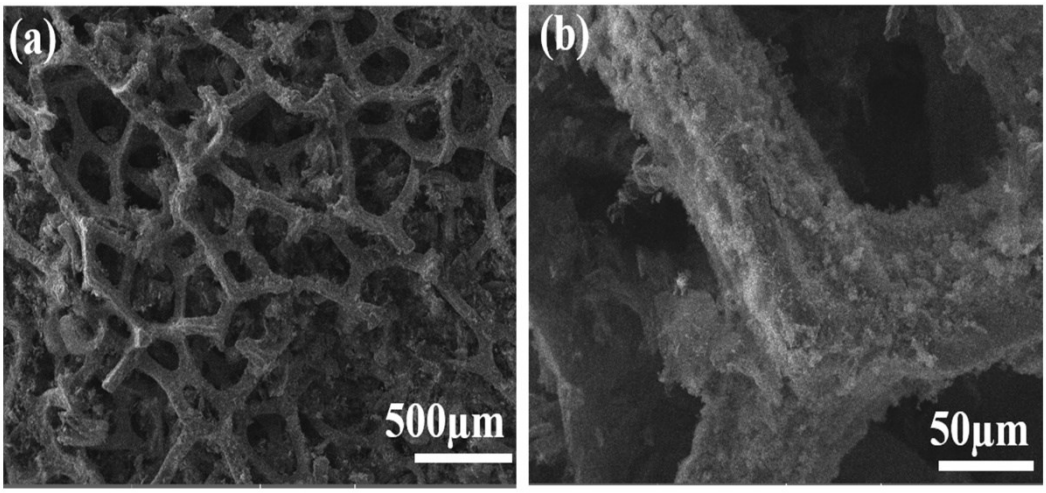

Figure S2. (a), (b) SEM images of the LIFT graphene/Cu_xO @Ni foam after 1000 cycles CV test.

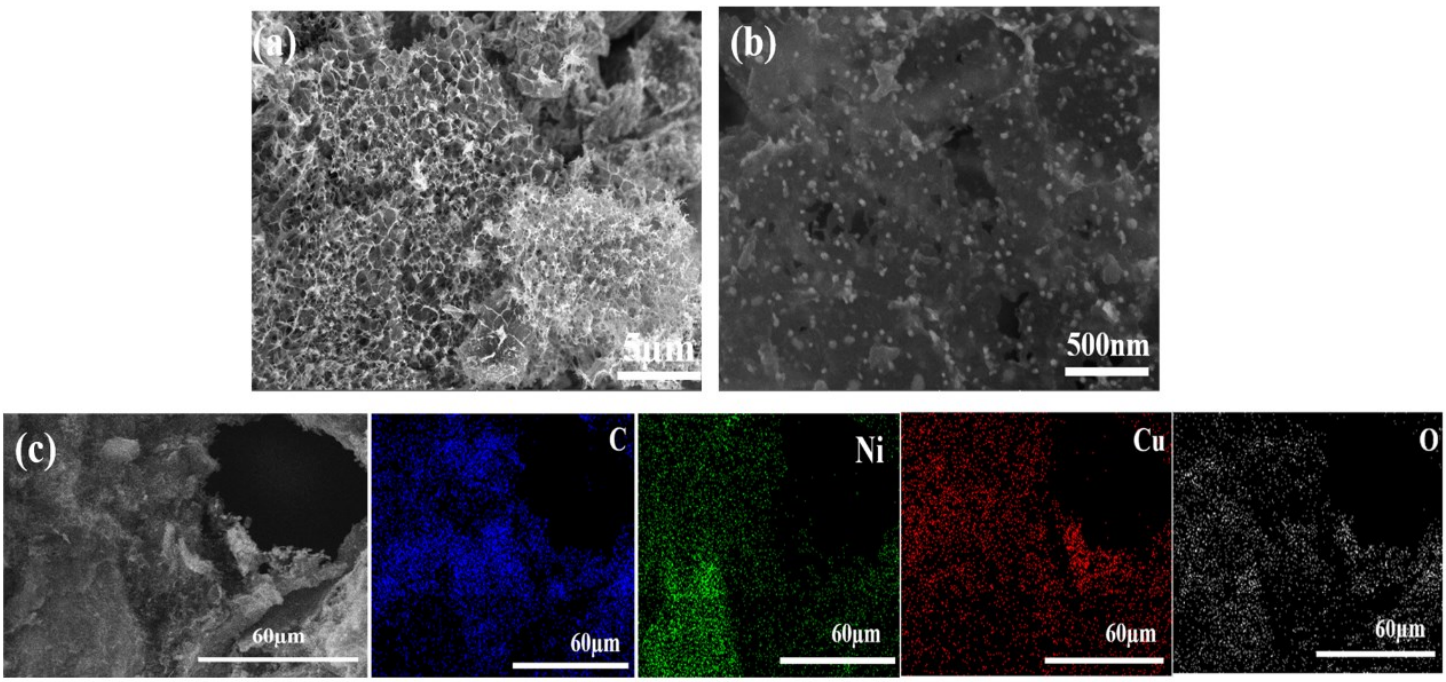

Figure S3. (a), (b) FESEM images of the porous LIFT graphene wrapped Cu_xO after1000 cycles CV test.
(c) EDX mapping of the LIFT graphene wrapped Cu_xO after1000 cycles CV test.

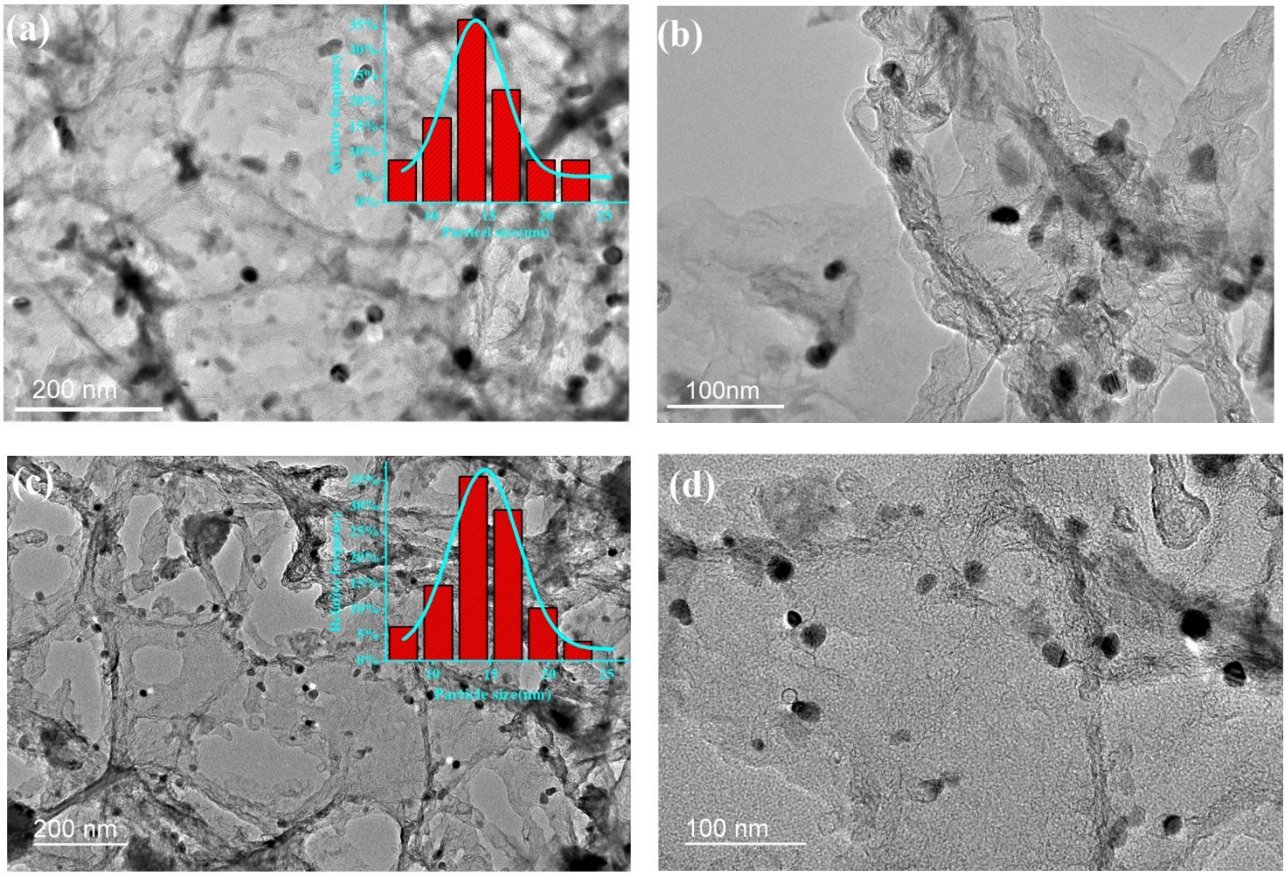
(a)
200 nm
(b)
100nm
(c)
200 nm
(d)
100 nm

Figure S4. TEM images of (a), (b) initial LIFT graphene/Cu_xO, (c), (d) LIFT graphene/Cu_xO after 1000 cycles CV test.

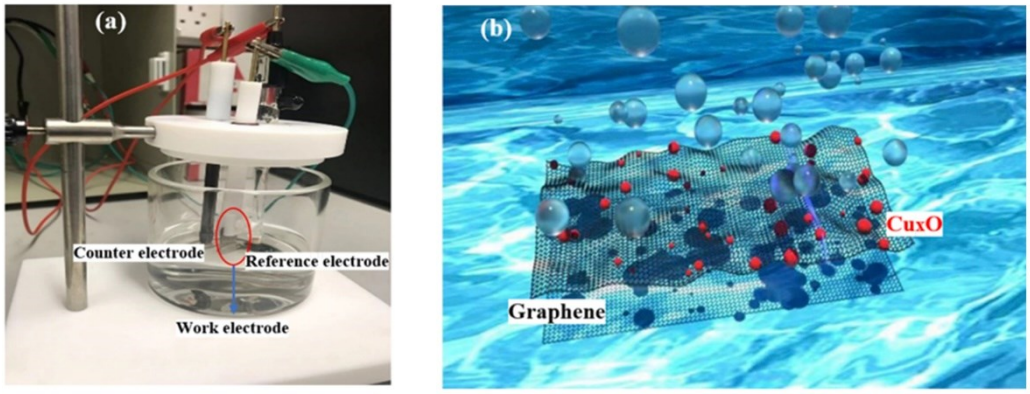

Figure S5. Pictures of (a) experiment set-up of the three-electrode: a graphite rod and a mercuric oxide electrode as the counter and reference electrode respectively, and (b) HER process in 1M KOH.

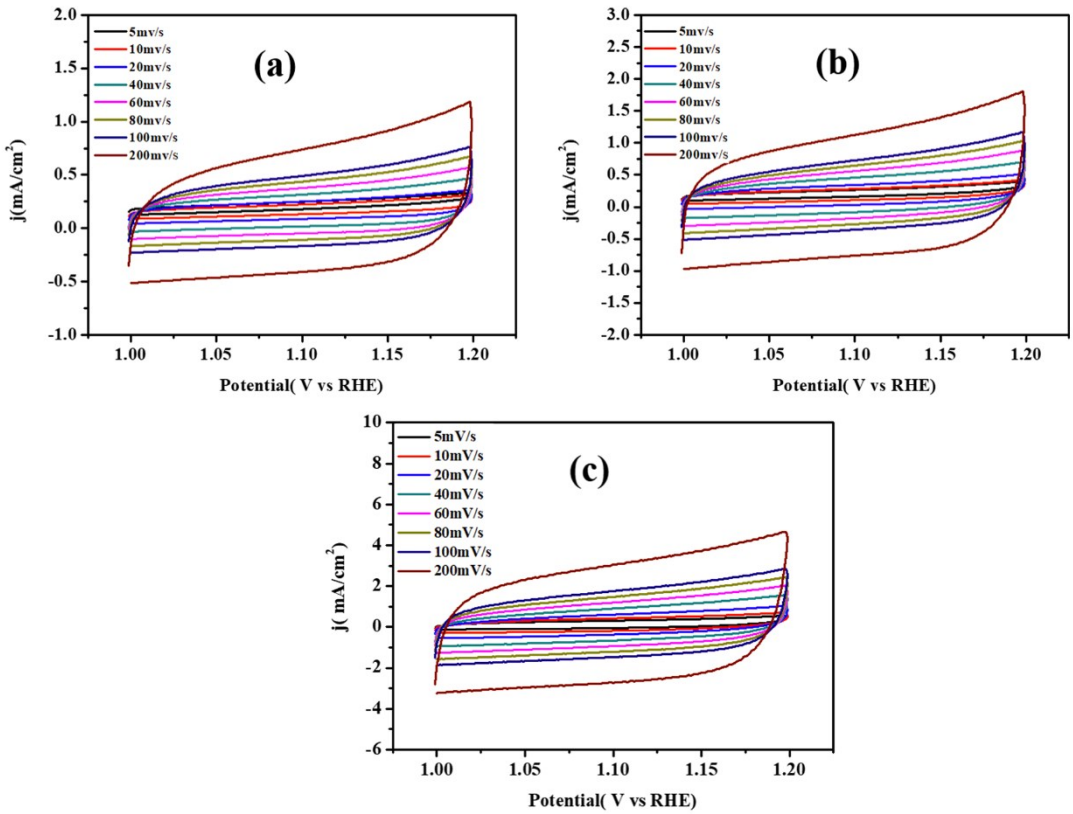

Figure S6. CV cures of bare Ni foam (a), LIFT graphene @Ni foam (b), and LIFT graphene/Cu_xO @Ni foam(c) at different scan rates.

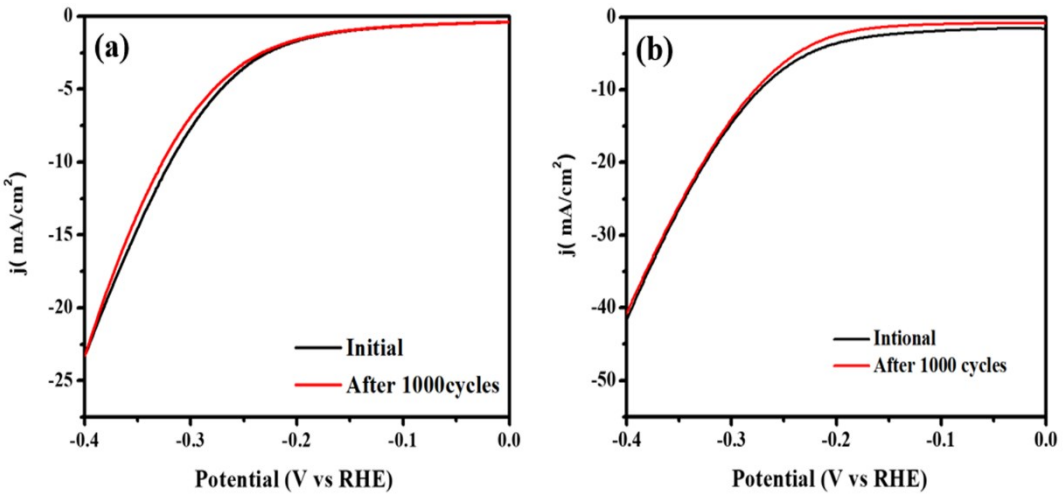

Figure S7. LSV curves for (a) initial bare Ni foam and after 1000 cycles CV tests, (b) initial LIFT graphene @Ni foam and after 1000 cycles CV tests

Table S1 Comparison of the HER performance of different Cu-based catalysts/electrodes obtained from different approaches.

Catalyst/electrode	**Electrolyte**	**η(mV)@j mA cm^{-2}**	**Tafel slope (mV dec^{-1})**	**Preparation method**	**Reference**
LIFT Graphene/Cu_xO/NiF	1M KOH	149.6@10	157	Laser deposition	This work
Cu_3P/CF	1M KOH	210@20	127	Anodization/calcination /Phosphorization	J. Phys. Chem. C 2017, 121, 25875-25881
CuNPs/CNFs	0.5M H_2SO_4	200@10	152	CVD/carbonization/ electrospinning / thermal reduction	International journal of hydrogen energy 41(2016) 18044-18049
CoP@Cu_2P-Cu_3P/GC	1M KOH	118@10	72	two-step nanocasting-solid phase phosphorization	Sustainable Energy Fuels DOI: 10.1039/d0se01745k
$CuCo_2Se_4$	1M KOH	125@10	--	hydrothermal method	ACS Appl. Energy Mater. 2020, 3, 3092-3103
CuO@Ni/NiFe hydroxides	1M KOH	125@10	86	chemical oxidation-calcination /room-temperature interfacial Galvanic reaction	Electrochimica Acta 318 (2019) 695-702
Cu_3P@NF	1M KOH	105@10	--	Hydrothermal method /phosphorization	ACS Appl. Mater. Interfaces 2017, 9, 2240-2248
Cu@NiFe LDH /CF	1M KOH	116@10	58.9	chemical oxidation/air annealing /electroreduction/electrodeposition	Energy Environ. Sci., 2017, 10, 1820--1827
Cu_2S@Cu	1M KOH	316@10	76	sulfurization reaction	International journal of hydrogen energy 44(2019) 1620-1626
CMS/Ni	1M KOH	213@50	80	hydrothermal method	Mater. Adv., 2021, 2, 455-463
Co–P/CuO CF	1M KOH	95@20	--	chemical oxidation/ Air annealing/ electrodeposition	Dalton Trans., 2019, 48, 891–897
NiCoP@Cu_3P/CF	1M KOH	54@10	72	Chemical oxidation /hydrothermal method	J. Mater. Chem. A, 2018, 6, 2100–2106
Cu@CoFe LDH	1M KOH	171@10	36.4	chemical oxidation	Nano Energy 41 (2017)

				/electrodeposition	327–336
Copper-nickel-sulfide NWS	1 M alkaline	70@10	44	multi-step wet chemistry strategy	Chem. Commun., 2019, 55, 8154--8157
$CuCo_2S_4$ TSAs	1M KOH	69@10	55.4	hydrothermal method	J. Mater. Chem. A, 2020, 8, 1799–1807