Supplementary Materials

Accelerating glucose electrolysis on Cu-doped MIL-88B for an energy efficient anodic reaction in water-splitting

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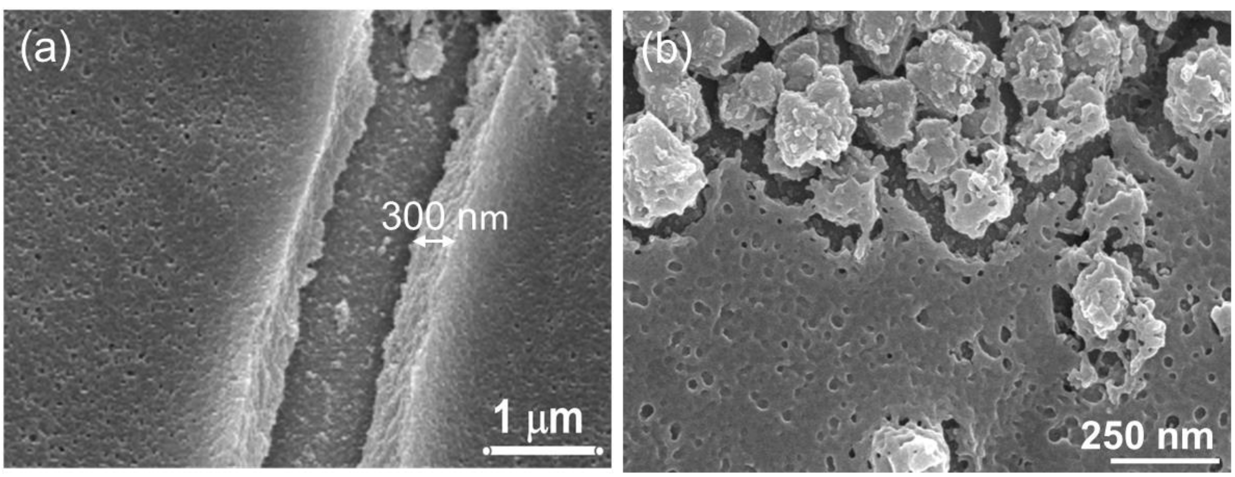

Figure S1. SEM image of the cracked surface view of the Cu-doped@MIL-88B film on a nickel foam (a) showing film thickness of ca. 300 nm, and (b) the MOF particles are deposited just underneath the thin nano-porous top layer.

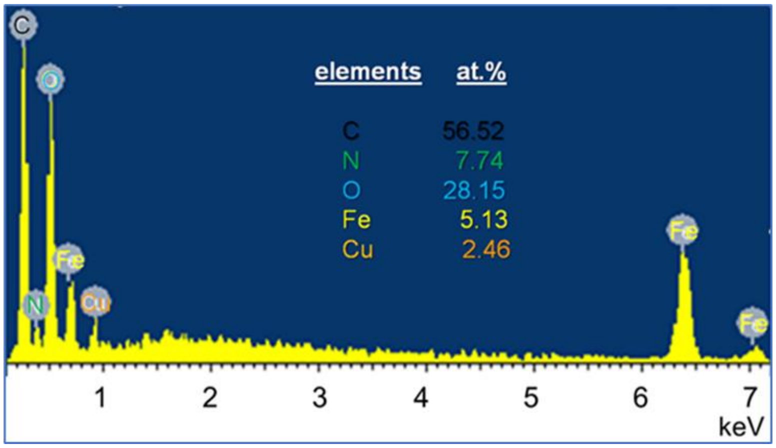

Figure S2. X-ray energy dispersive spectroscopy (EDS) spectrum and the atomic % of constitutional element of powder Cu-doped@MIL-88B.

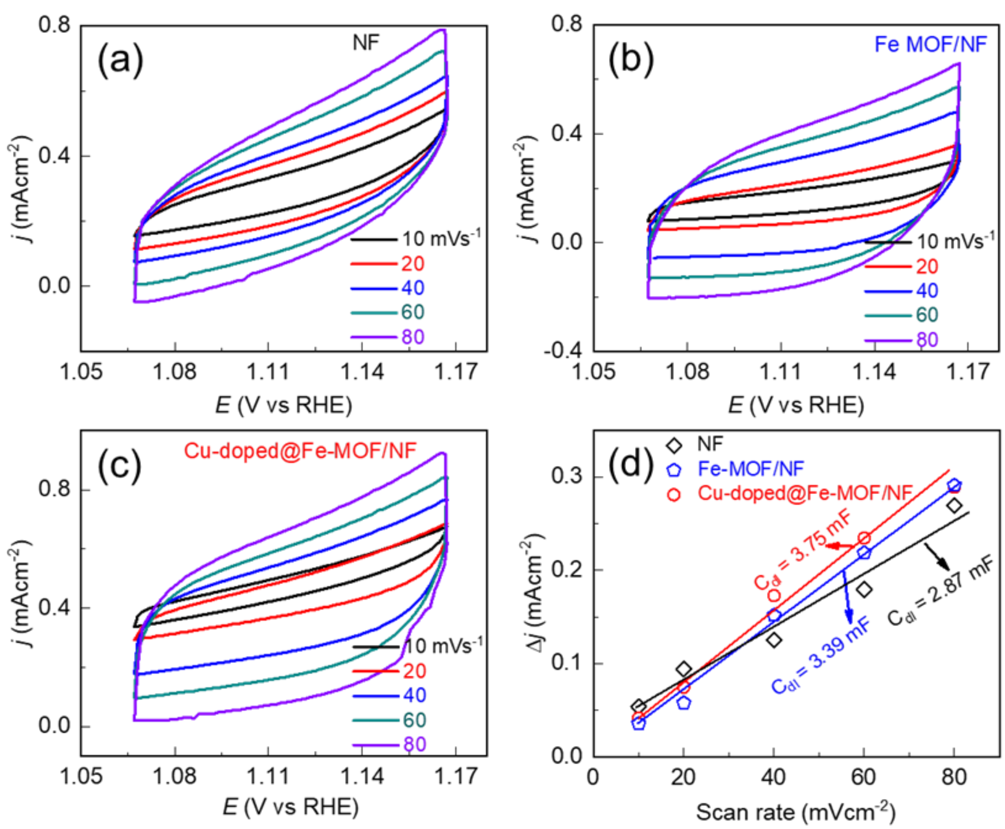

Figure S3. cyclic voltammograms of the (a) NF, (b) MIL-88B/NF and (c) Cu-doped@MIL-88B/NF, electrodes measured at various scan speeds in 0.1 M glucose + 1.0 M KOH solution in a non-Faradic region. (d) Linear plots of average current density (Δj) as a function of scan speeds. The slopes of curves provide the double layer capacitance (C_{dl}).

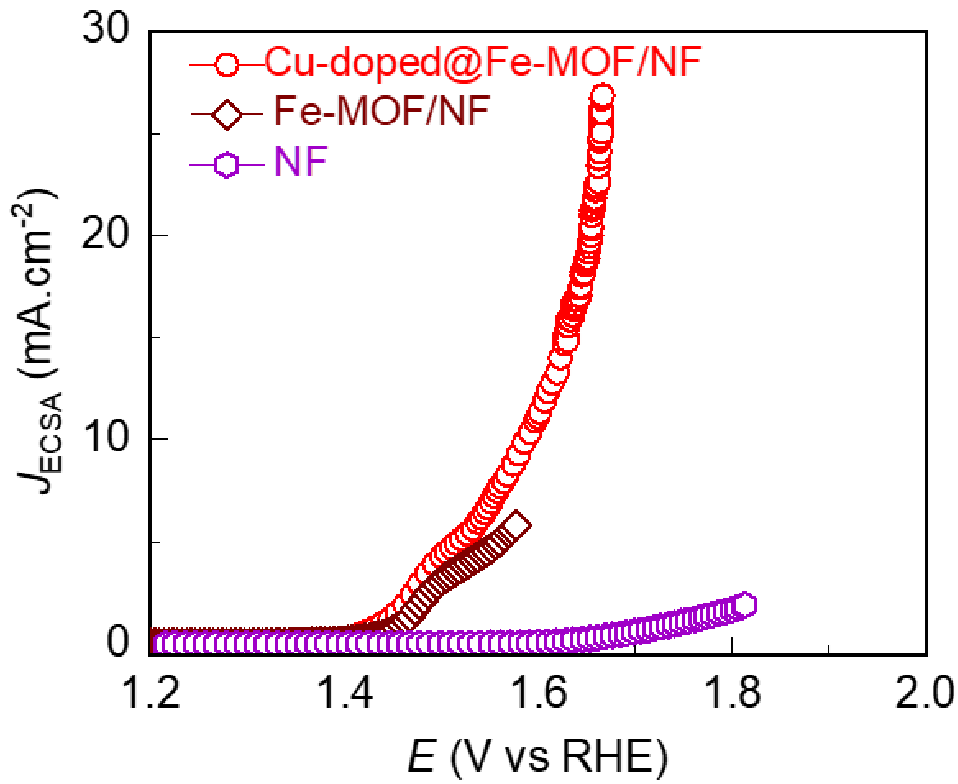

Figure S4. ECSA normalized LSV polarization curves for GOR in 0.1 M glucose + 1.0 M KOH aqueous electrolyte solution.

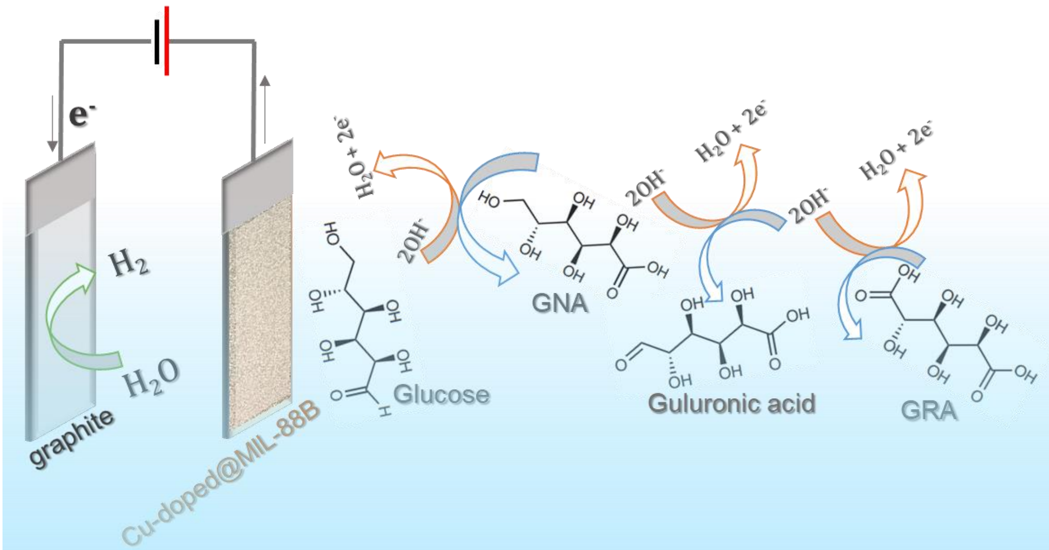

Figure S5. Schematic diagram showing the electrolysis of glucose. At the Cu-doped@MIL-88B based anode, glucose oxidation involves the 2-electron transfer in the oxidation of −CHO to −COOH (C1-position) followed by 4-electron transfer in the oxidation of $-CH_2OH$ to −COOH (C6- position).[*] At the cathode, reduction of water leads to the hydrogen evolution reaction.

[*]W. J. Liu, Z. Xu, D. Zhao, X.-Qi. Pan, H.-C. Li, X. Hu, Z.-Y. Fan, W.-K. Wang, G.-H. Zhao, S. Jin, G. W. Huber, H.-Q. Yu, Nat Commun. 2020, 11, 265.

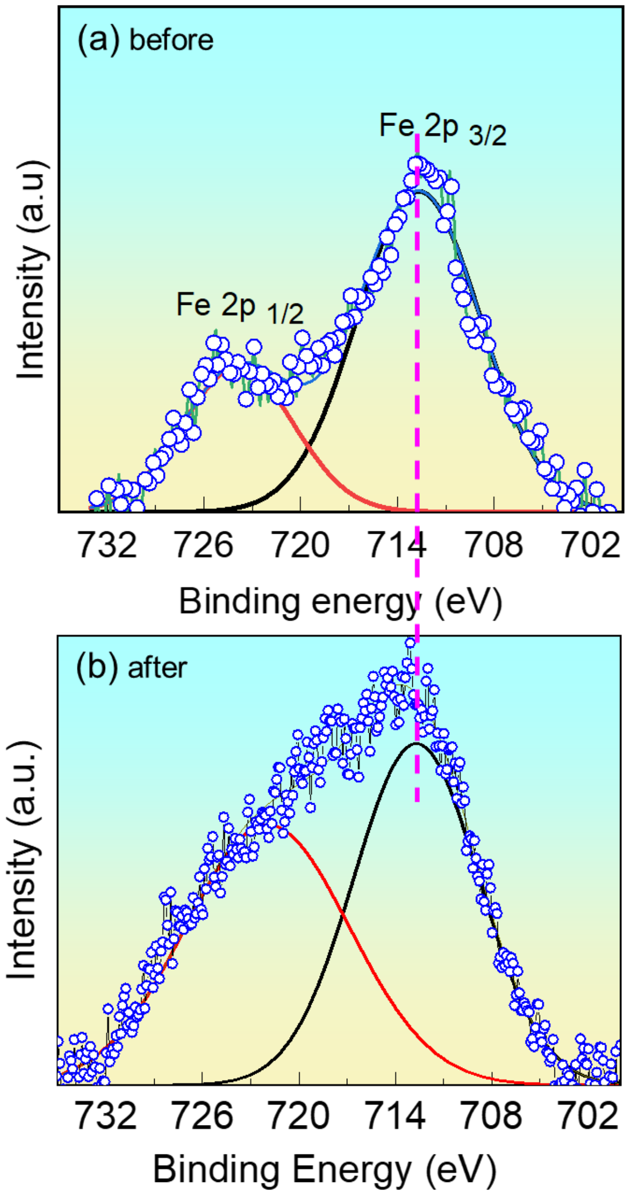

Figure S6. Fe 2p XPS spectra of the Cu-doped@MIL-88B/NF electrode (a) before and (b) after, the long-term electrochemical durability test for 50 h at 10 $mAcm^{-2}$ in 1.0 M KOH +0.1 M glucose solution.

Table S1. Comparison on glucose oxidation activity of various electrocatalysts.

Catalysts	***Electrolyte***	***Current density (mA.cm^{-2})***	***GOR potential V vs RHE***	***Ref.***
Cu-doped@MIL-88B/NF	0.1 M glucose + 1.0 M KOH	10 100 200 350	1.35 1.42 1.46 1.48	**This work**
MIL-88B/NF	0.1 M glucose + 1.0 M KOH	10 100 200	1.39 1.46 1.48	**This work**
Cu(OH)2	0.1 M glucose + 1.0 M KOH	100	~ 1.49*	[1]
Fe2P films	0.5 M glucose + 1.0 M KOH	100	1.58	[2]
NiFeOx-NF NiFeNx-NF	0.1 M glucose + 1.0 M KOH	100 100	~1.31* ~1.36*	[3]
Cu/CoNC	0.1 M glucose + 1.0 M KOH	100	~1.42*	[4]

*GOR potentials are estimated from the LSV polarization curves given in the corresponding works.

SI-References

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[2] P. Du, J. Zhang, Y. Liu, M. Huang, *Electrochem. Commun*. 2017, **83**, 11.

[3] W. J. Liu, Z. Xu, D. Zhao, X.-Qi. Pan, H.-C. Li, X. Hu, Z.-Y. Fan, W.-K. Wang, G.-H. Zhao, S. Jin, G. W. Huber, H.-Q. Yu, Nat Commun. 2020, **11**, 265.

[4] Y. Xin, F. Wang, L. Chen, Y. Li, K. Shen, Green Chem. 2022, **24**, 6544.