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Supplementary Information

Understanding the Role of Nickel–Iron (Oxy)hydroxide (NiFeOOH) Electrocatalysts on Hematite Photoanodes

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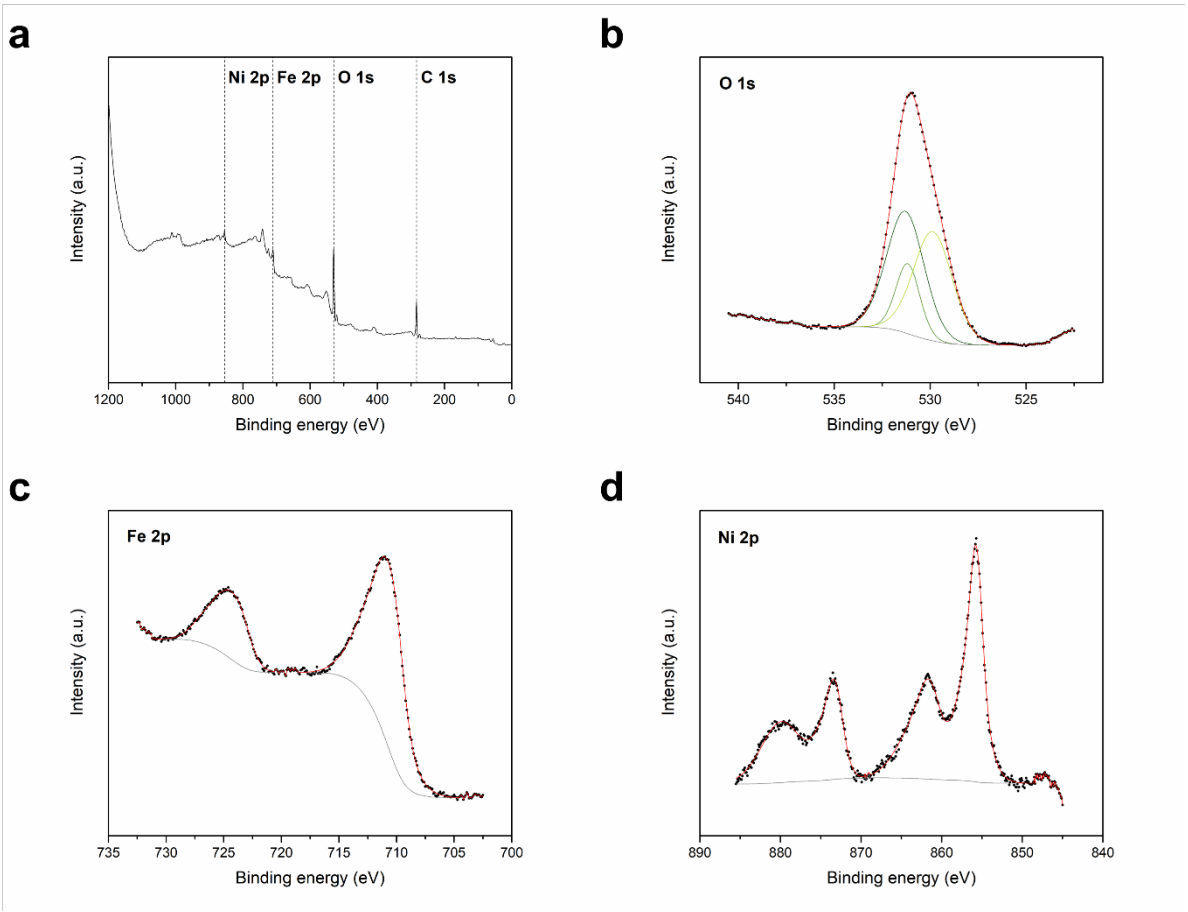

Fig. S1 XPS core level spectra of Ni 2p region, Fe 2p region, and O 1s region for the NiFeOOH film deposited at 1 V (vs. Ag/AgCl) for 30 min on the Au substrate.

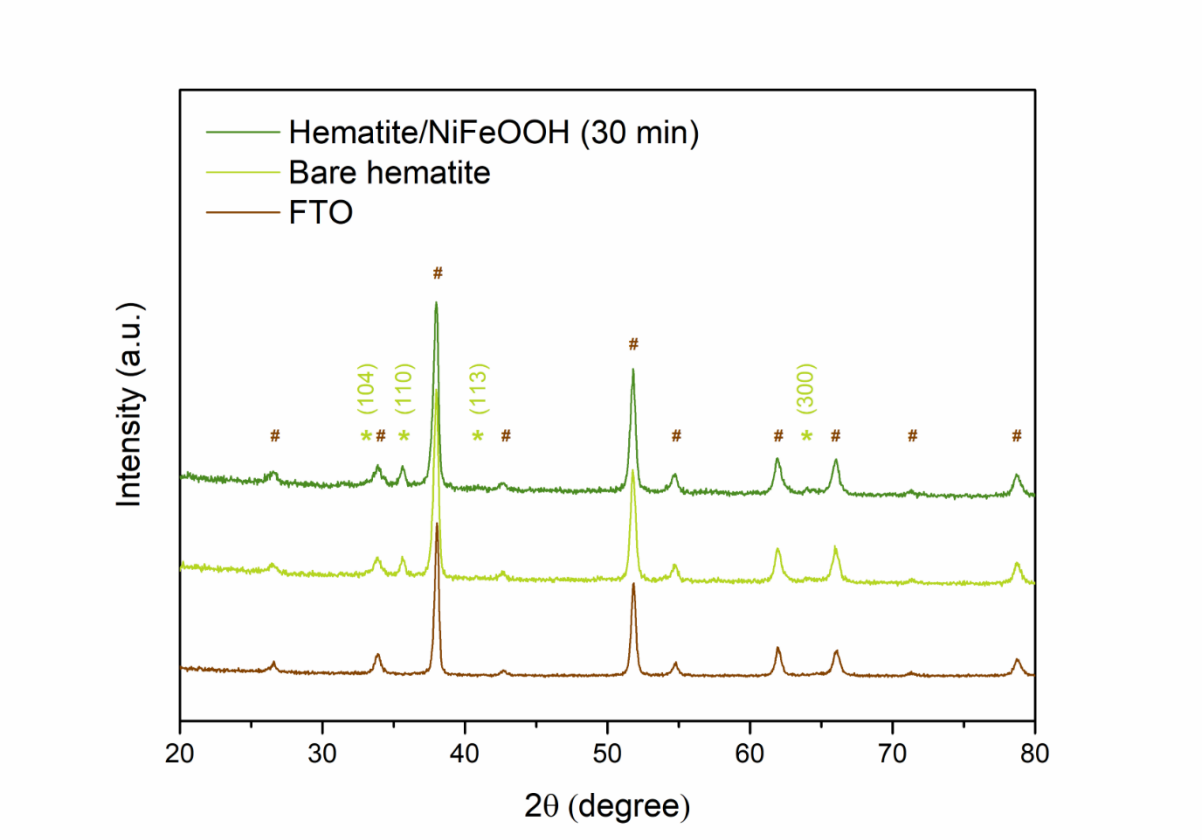

Fig. S2 XRD patterns of FTO substrate (brown), bare hematite (light green) and NiFeOOH-coated hematite (dark green). The diffraction peaks labeled with a hash correspond to FTO. The diffraction peaks labeled with an asterisk are for hematite.

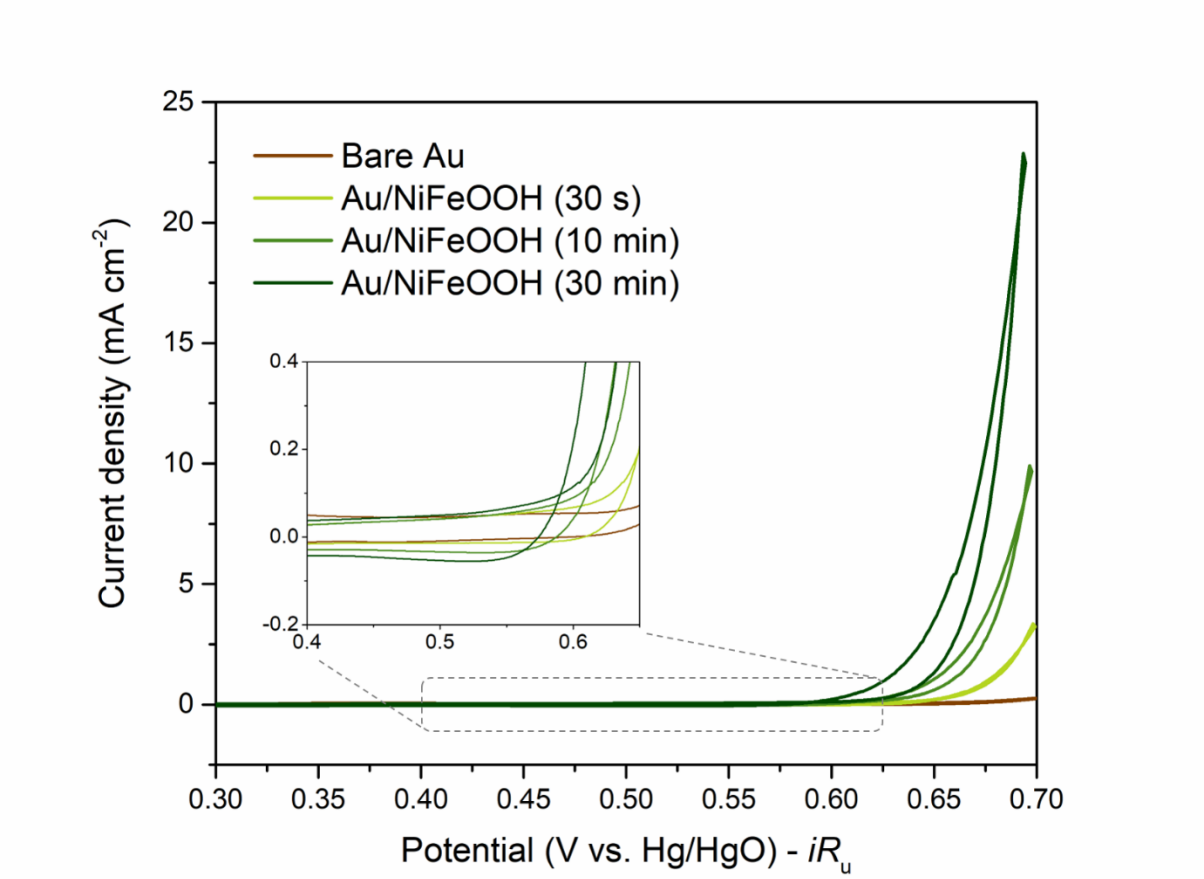

Fig. S3 iR_u-corrected cyclic voltammograms of NiFeOOH electrocatalysts on Au substrates in 1 M KOH at the scan rate of 10 mV s^{-1}.

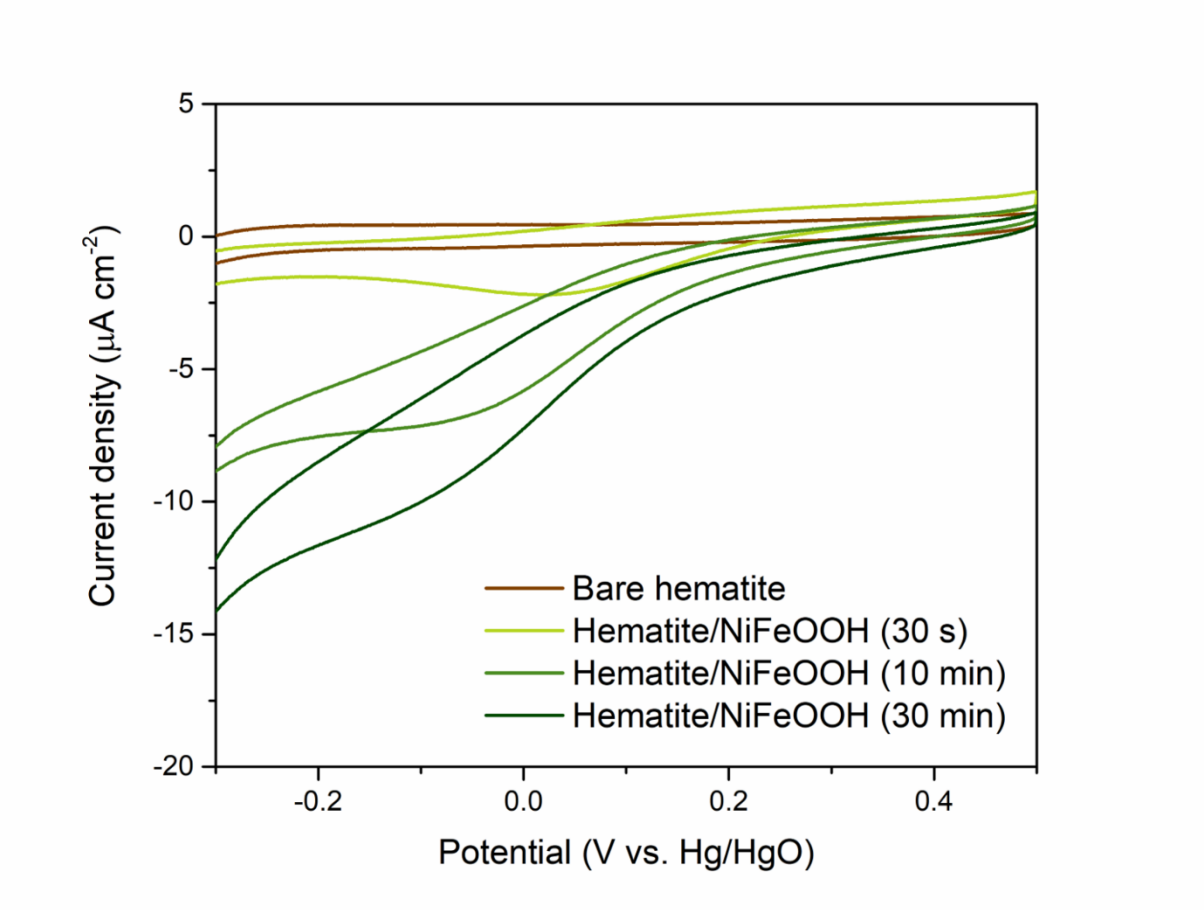

Fig. S4 Cyclic voltammograms of hematite photoanodes with varying thicknesses of NiFeOOH film in 1 M KOH at the scan rate of 10 mV s^{-1} in the dark.

Table S1 Electronic properties obtained from Mott-Schottky analysis.

	Slope	N_D (cm^{-3})	E_{FB} (V)
Bare hematite	5.56×10^{10}	7.92×10^{19}	-0.37
Hematite/NiFeOOH (30 s)	4.80×10^{10}	9.18×10^{19}	-0.39
Hematite/NiFeOOH (30 min)	5.92×10^{10}	7.44×10^{19}	-0.37

$$\frac{1}{C_{SC}^2} = \frac{2}{\varepsilon_0 \varepsilon_r e N_D A^2} \left(E - E_{FB} - \frac{kT}{e}\right)$$

where C_{SC} is the space charge capacitance at the surface of the hematite electrode, ε_0 is the permittivity of vacuum, ε_r is the relative permittivity (assumed to be 32 for hematite[1]), e is the elementary charge, N_D is the donor density, A is the geometric surface area, E is the applied potential, E_{FB} is the flat band potential, k is the Boltzmann constant, T is the absolute temperature.

References

1 O. Zandi, A. R. Schon, H. Hajibabaei and T. W. Hamann, *Chem. Mater.*, 2016, **28**, 765–771.