Supplementary Information (SI) for New Journal of Chemistry.

Supporting Information

Mn doping induced electronic modulation of self-supported NiFe layered double hydroxides for oxygen evolution reaction

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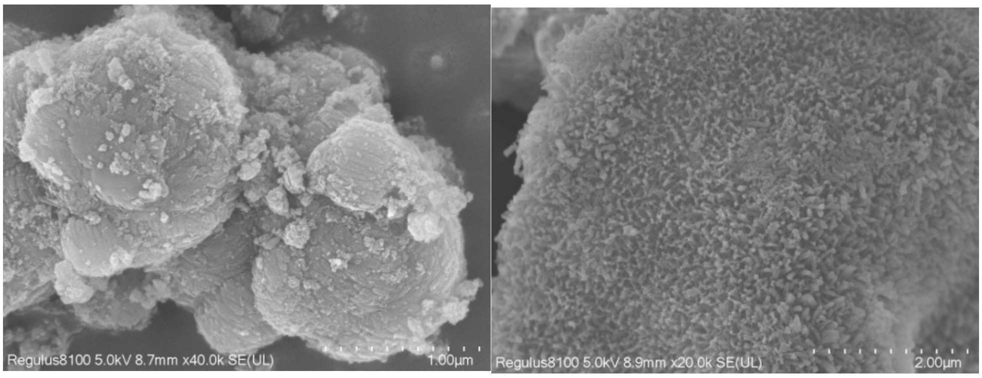

Figure S1. SEM image of (a) NiFe-LDH, (b) MnNiFe-LDH.

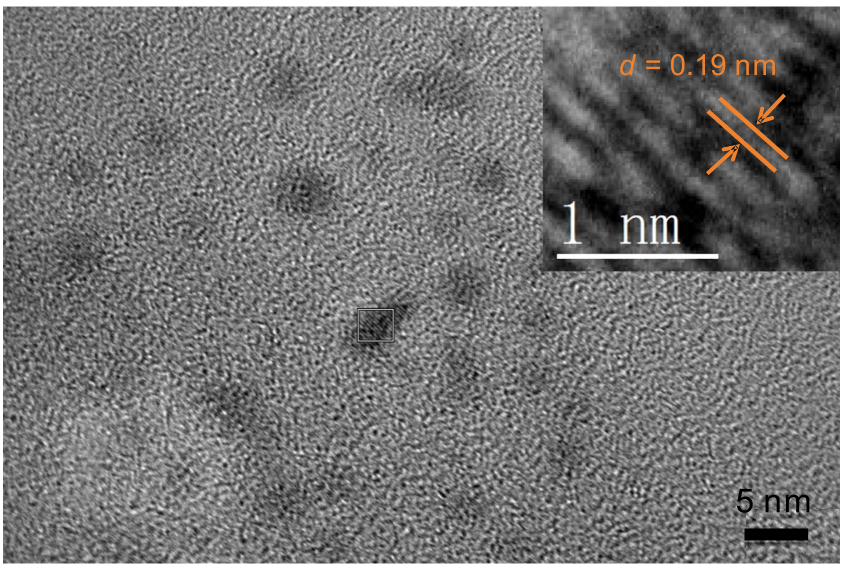

Figure S2. HRTEM image of NiFe-LDH.

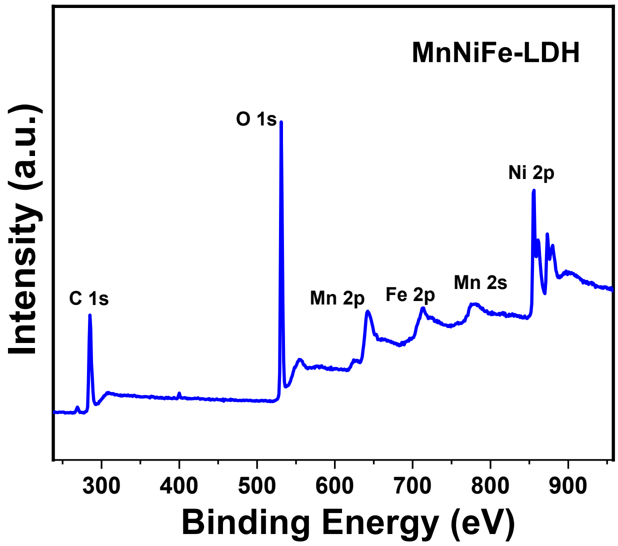

Figure S3. Full high-resolution XPS spectrum of Mn-doped NiFe-LDH.

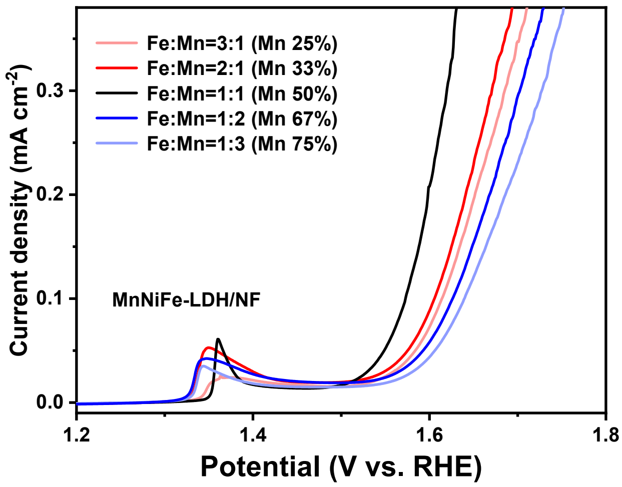

Figure S4. OER activity of MnNiFe-LDH/NF electrocatalysts different Mn doping concentration with corresponding doping concentration at 30 °C in 1M KOH.

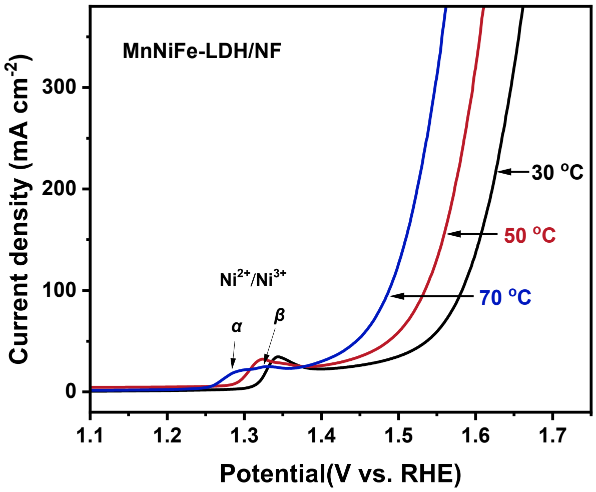

Figure S5. OER activity of MnNiFe-LDH electrocatalyst on NF at 30-70 °C with 85% iR compensation.

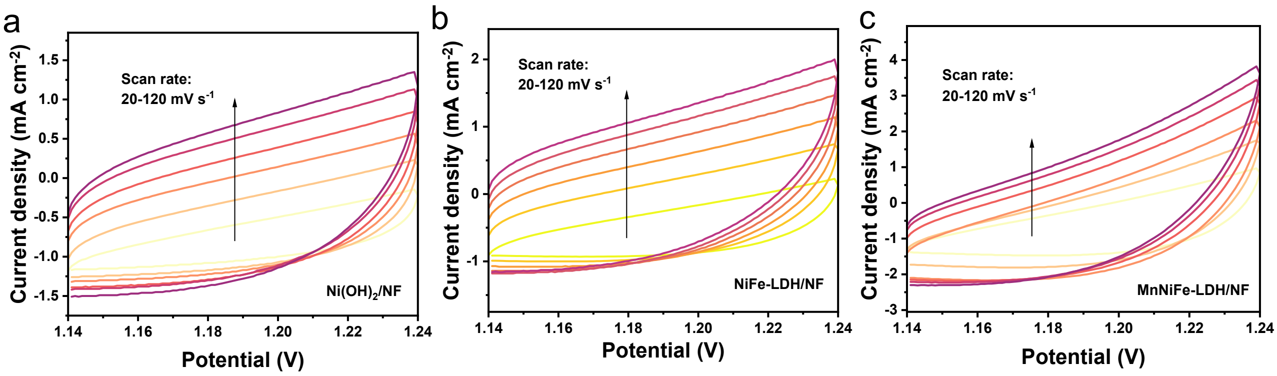

Figure S6. Cyclic voltammetry (CV) curves of (a) $Ni(OH)_2$/NF, (b) NiFe-LDH/NF and (c) MnNiFe-LDH/NF electrodes in the non-faraday double layer region at scan rates of 20-120 mV s^{-1} in 1M KOH.

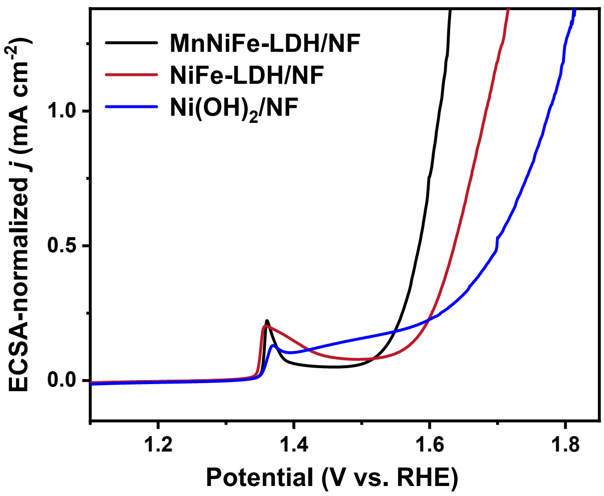

Figure S7. ECSA-normalized LSV curves.

Table S1. The mass percentage from ICP analysis for MnNiFe-LDH samples.

	Mn	**Ni**	**Fe**
Mass%	0.81%	27.1%	0.32%

Table S2. The effects of temperature on pH and reference electrode potential.

Temperature (K)	**pH**	**2.303RT/nF*pH (V)**	**$\Delta E_{Ag/AgCl,T}$ (V)**	**[a] E_{RHE} (V)**	**[b] E^{o}_{H2O} (V)**
303.15	13.7	0.82418	0.194	$E_{Ag/AgCl}$+1.01818	1.2245
323.15	13.1	0.84008	0.174	$E_{Ag/AgCl}$+1.01408	1.2065
343.15	12.5	0.85121	0.154	$E_{Ag/AgCl}$+1.00521	1.1885

[a] All measured potentials in this work were converted to reversible hydrogen potential (RHE) according to Nernst equation of $E_{RHE} = E_{Ag/AgCl} + (2.303RT/nF)pH + \Delta E_{Ag/AgCl,T}$, considering the effect of temperature on electrode slope by (2.303RT/nF)pH and the effect of temperature on the Ag/AgCl reference electrode potential by a potential corrective term of $\Delta E_{Ag/AgCl,T} = -10^{-3}T+0.497$. The $\Delta E_{Ag/AgCl,T}$ - T relationship was obtained by fitting the experimental data from Ref. 1.
[b] The temperature-dependent theoretical thermodynamic water splitting potential (E^{o}_{H2O}) is calculated by an empirical equation of $E^{o}_{H2O} = 1.229-0.9\times10^{-3}(T-298)$[2].

Table S3. Fitting parameters of EIS data obtained by using the equivalent circuit proposed in Fig. 3e**.**

	R_s (Ω)	**R_{ct} (Ω)**	**CPE-T (F)**	**CPE-P (F)**
$Ni(OH)_2$/NF	2.04	5.35	0.23	0.51
NiFe-LDH/NF	1.87	3.48	0.13	0.70
MnNiFe-LDH/NF	1.99	1.40	0.17	0.78

References

[1] D. T. Sawyer, A. Sobkowiak, J. L. Roberts, *Electrochemistry for Chemists, 2nd Edition*, **1995**.
[2] A. Awasthi, K. Scott, S. Basu, *Int. J. Hydrogen Energy* **2011**, 36, 14779.