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Supporting information

The release of metal ions induced surface reconstruction of layered double hydroxide electrocatalyst

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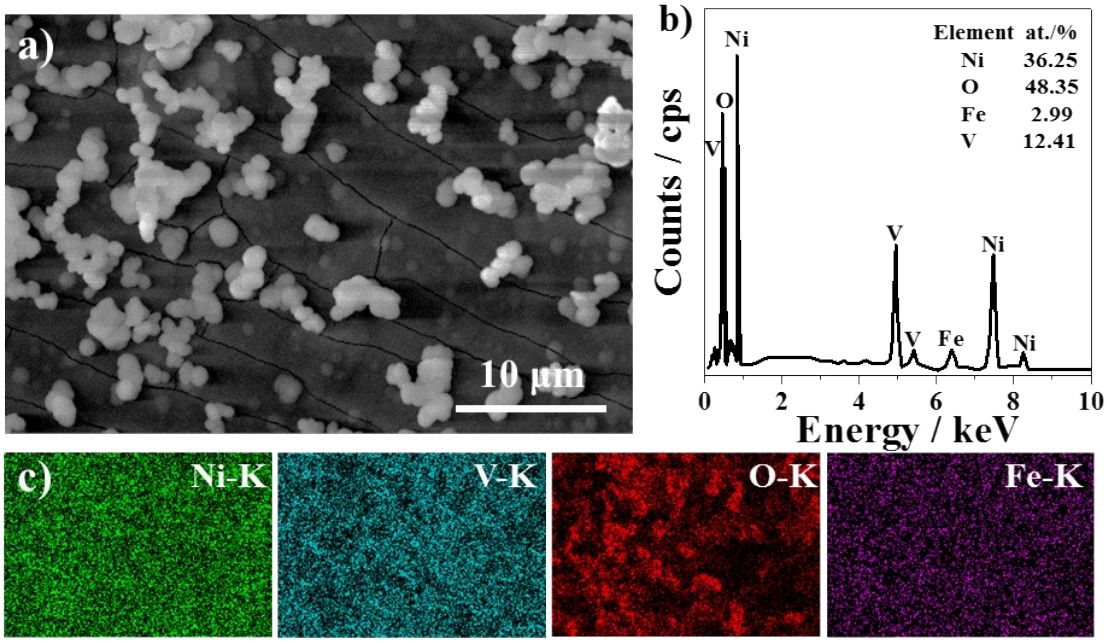

Figure S1. SEM image (a), EDS pattern (b), and corresponding elemental mapping images (c) of O-NiFeV-LDH.

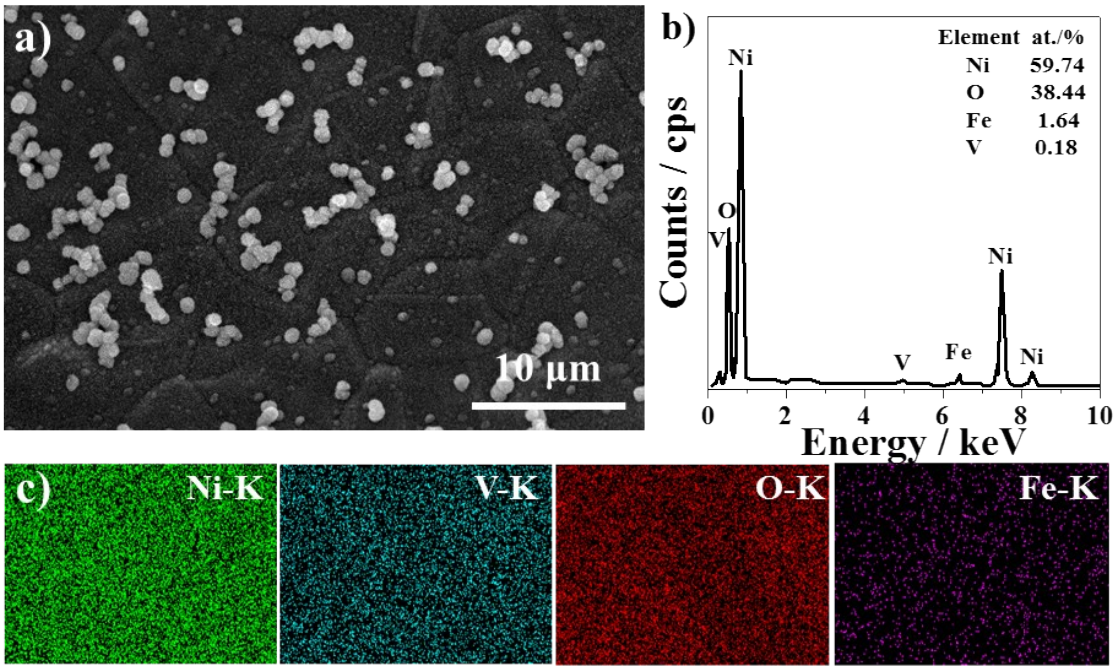

Figure S2. SEM image (a), EDS pattern (b), and corresponding elemental mapping images (c) of A-NiFeV-LDH.

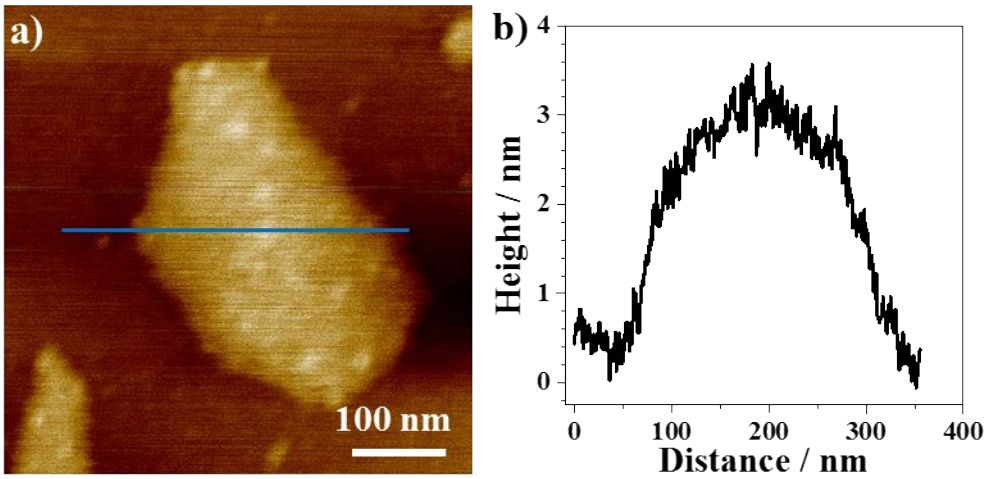

Figure S3. Representative AFM image (a) and corresponding line scan profile (b) of one O-NiFeV-LDH sheet deposited on a mica substrate.

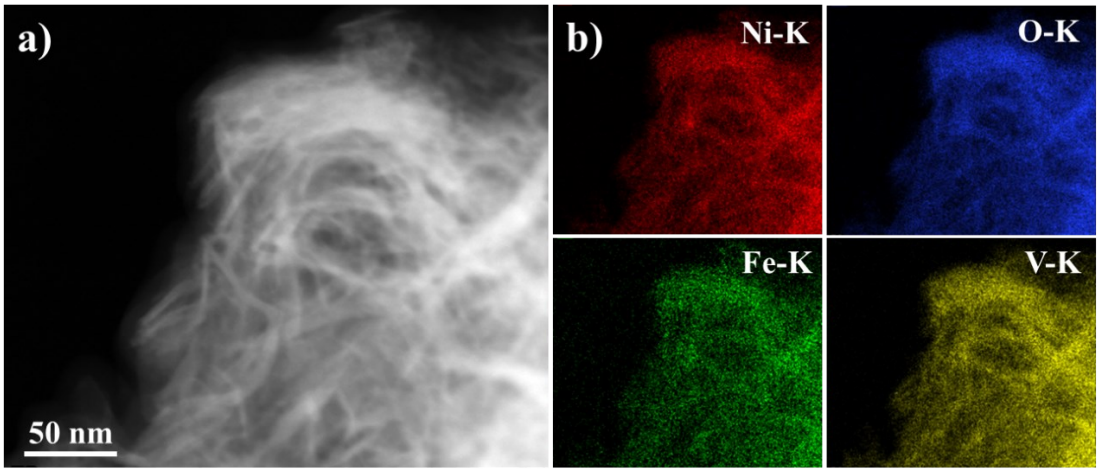

Figure S4. HAADF image (a) and corresponding STEM-EDS elemental mapping (Ni, O, Fe, and V) (b) of O-NiFeV-LDH.

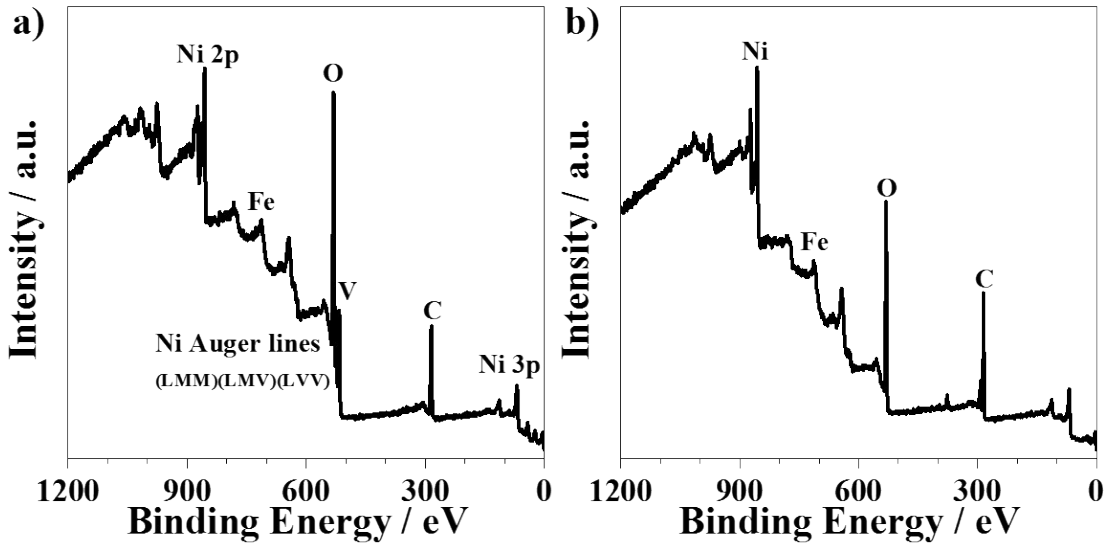

Figure S5. Survey XPS spectra of O-NiFeV-LDH (a) and A-NiFeV-LDH (b).

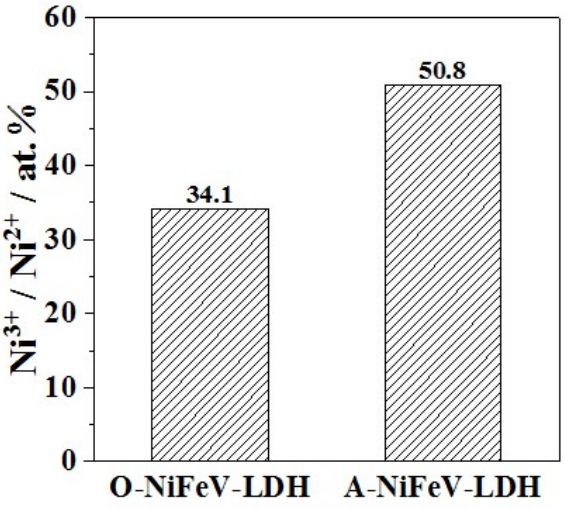

Figure S6. The valence state ratio of nickel (Ni^{3+} / Ni^{2+}) of O-NiFeV-LDH and A-NiFeV-LDH.

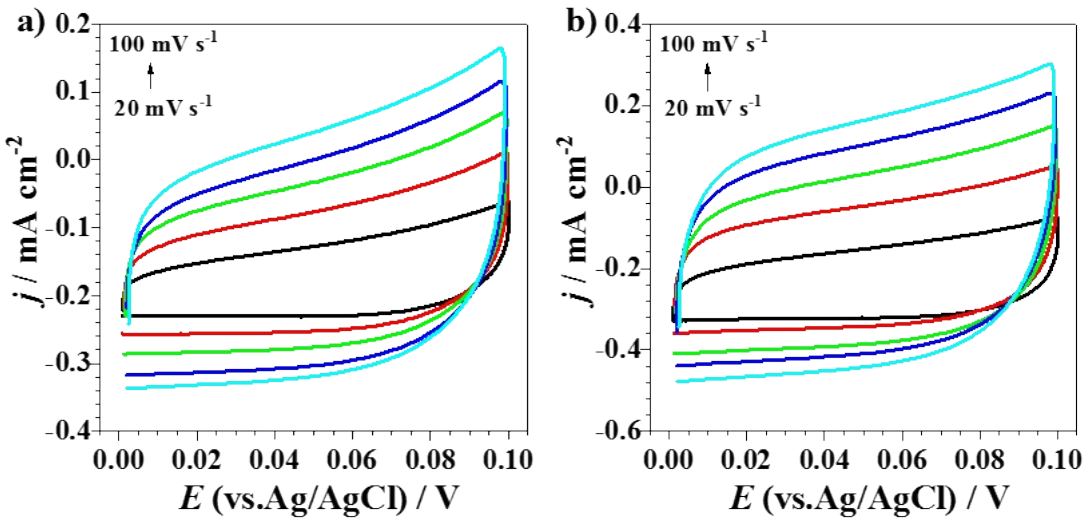

Figure S7. CV curves in the double layer region with various scan rates from 20 to 100 mV s^{-1} for O-NiFeV-LDH (a) and A-NiFeV-LDH (b).

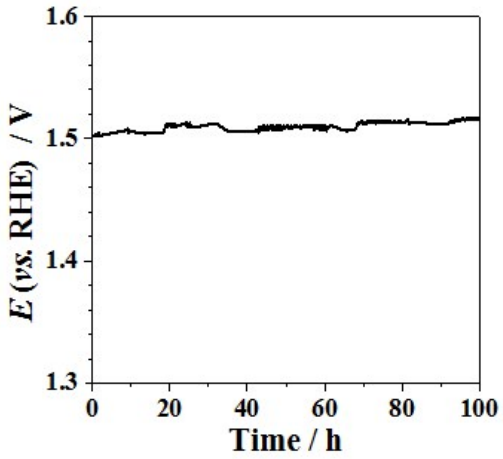

Figure S8. Chronopotentiometry curves of A-NiFeV-LDH during electrolysis at constant current densities of 10 mA cm^{-2} in 1.0 M KOH.

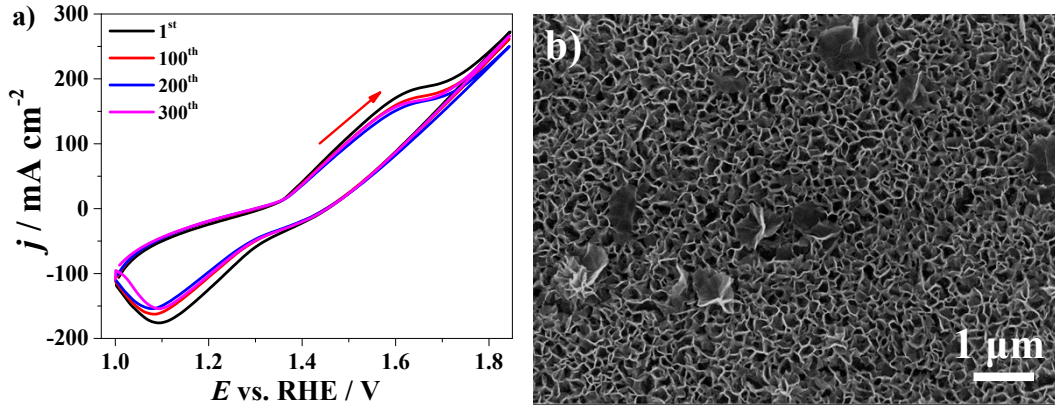

Figure S9. (a) 1st - 300th CV curves of A-NiFeV-LDH at a scan rate of 50 mV s^{-1} in 1.0 M KOH. (b) SEM image of A-NiFeV-LDH after 300 consecutive CV scans.

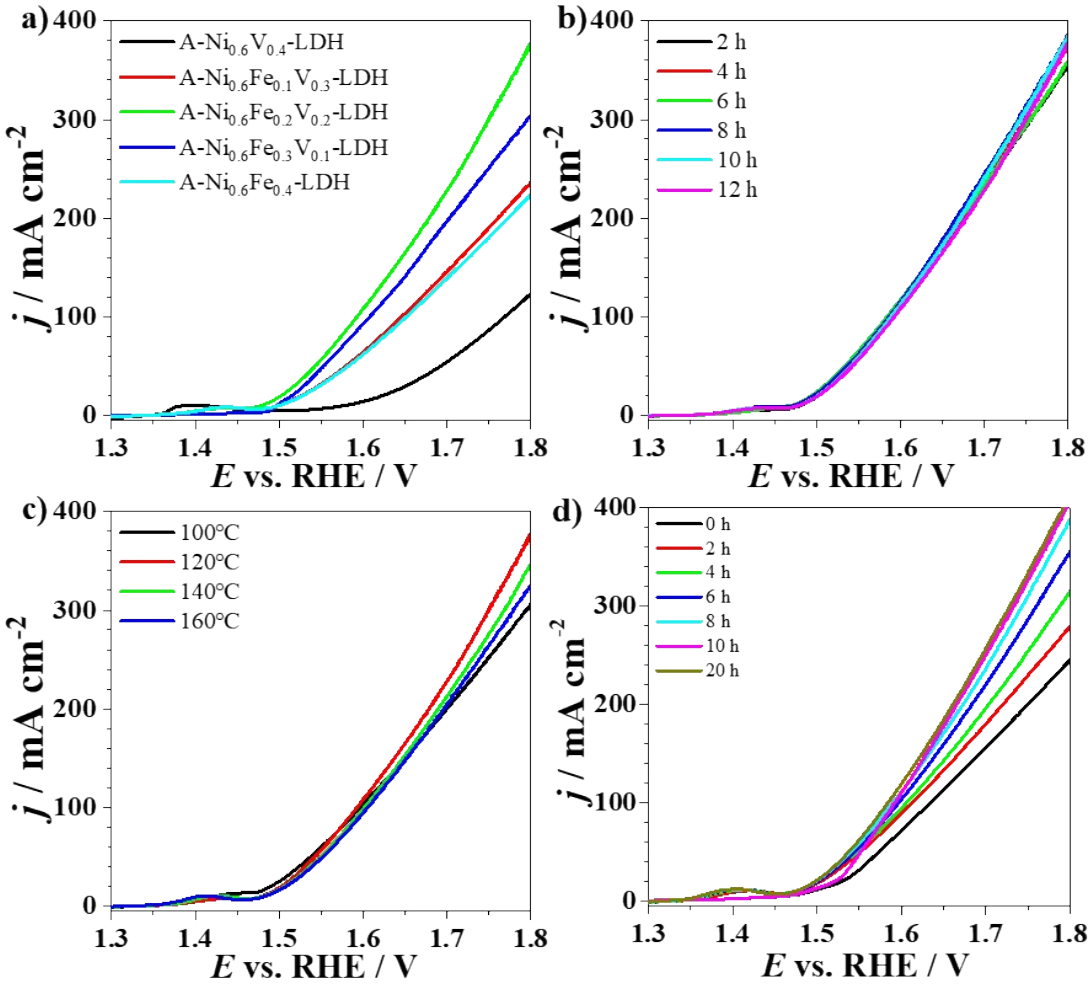

Figure S10. The influence of Fe^{3+} and V^{3+} concentrations (a), hydrothermal time (b), hydrothermal temperature (c), and activation time (d) on the LSV performance of A-NiFeV-LDH.

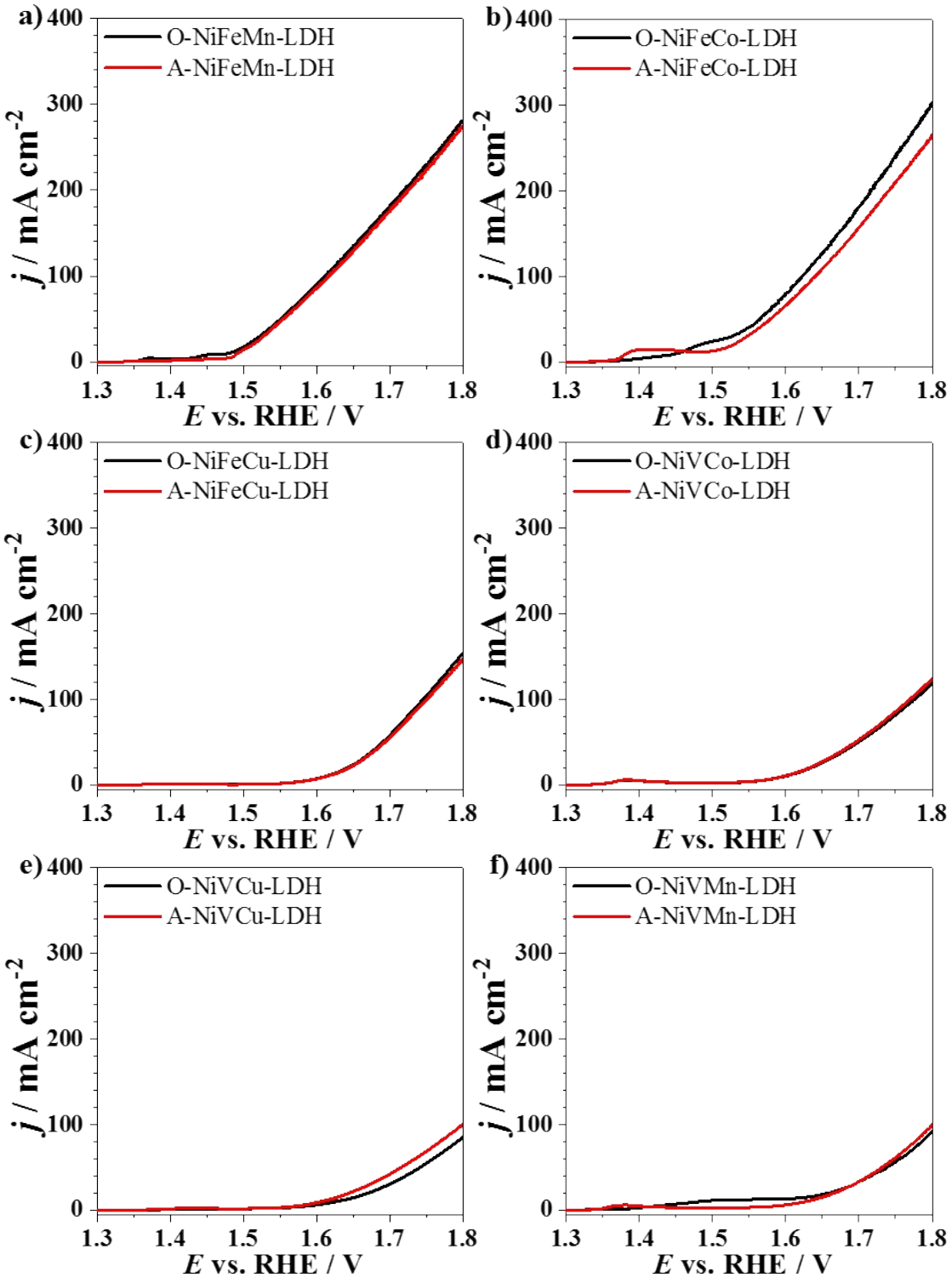

Figure S11. LSV curves of Ni-based LDHs before and after activation for 10 h: NiFeMn (a), NiFeCo (b), NiFeCu (c), NiVCo (d), NiVCu (e), and NiVMn (f).

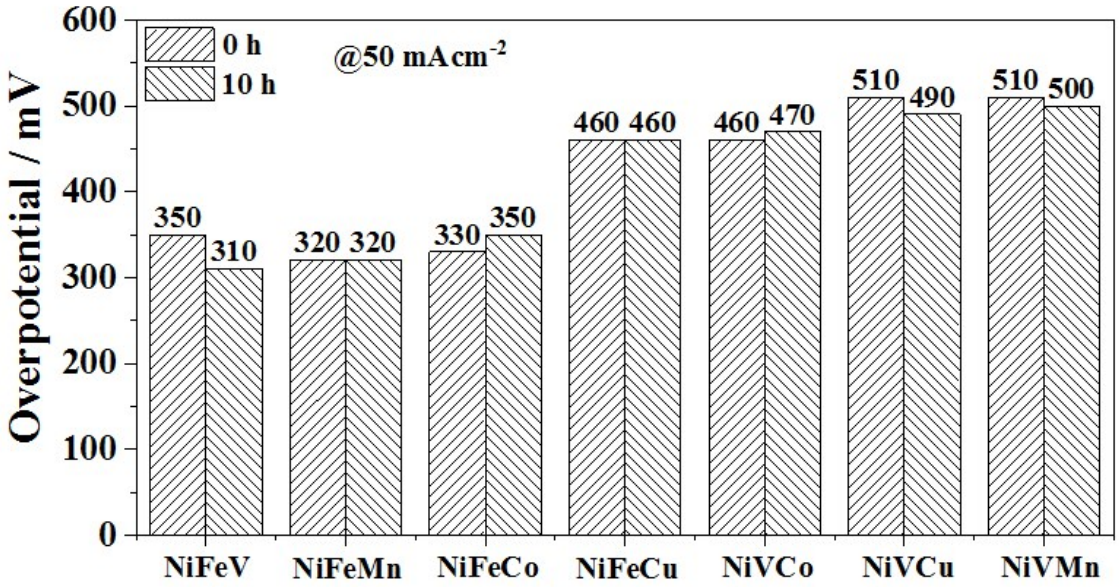

Figure S12. The overpotential at a current density of 50 mA cm^{-2} for NiFeMn, NiFeCo, NiFeCu, NiVCo, NiVCu, and NiVMn before and after activation for 10 h.

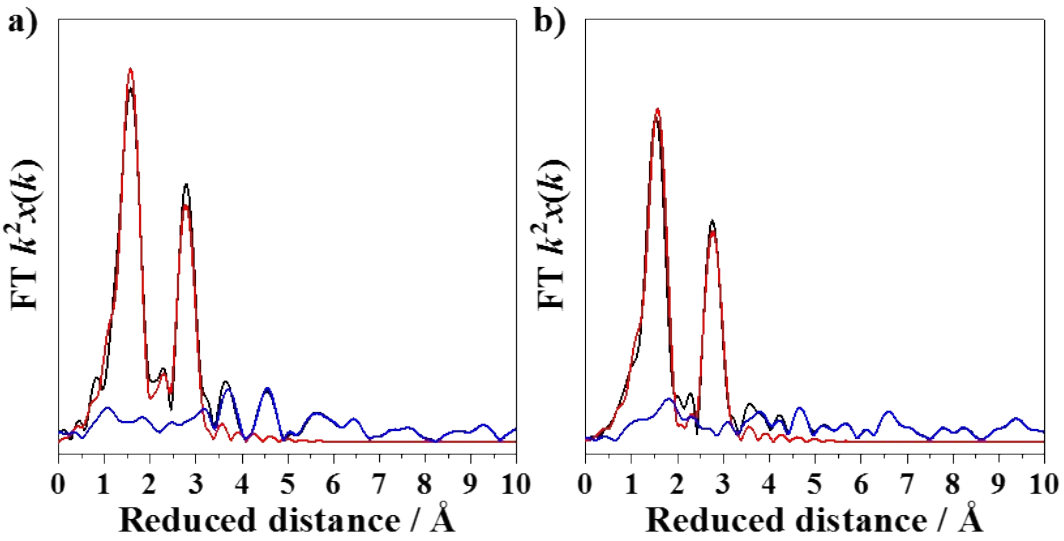

Figure S13. FT-EXAFS spectra and fits of Fe K-edges from O-NiFeV-LDH (a), and A-NiFeV-LDH (b). The red and blue lines represent the fitting values. Co K edge XANES spectra.

Table S1. Summary of the fitting parameters of Fe K-edge EXAFS curves for the NiFeV-LDH and A-NiFeV-LDH.

Sample	Fe-O		Fe-Fe		D. W.	ΔE_0 (eV)
	R (Å)	CN	R (Å)	CN		
O-NiFeV-LDH	2.01 ± 0.007	6.8 ± 0.3	2.60 ± 0.03 3.24 ± 0.01	0.9 ± 0.3 4.7 ± 0.5	0.006 (O)	-0.7 ±0.7
A-NiFeV-LDH	2.002± 0.007	6.1 ± 0.2	2.58 ±0.04 3.23 ±0.01	0.5 ± 0.2 4.2 ± 0.4	0.008 (Fe)	4.0±1.3

Fe K edge (7112 eV)

Amp: 0.73±0.07 (Fe foil)