Electronic Supplementary Material (ESI) for New Journal of Chemistry.

$Ni(OH)_2$ Coated CoMn-Layered Double Hydroxide Nanowires as Efficient Water Oxidation Electrocatalysts

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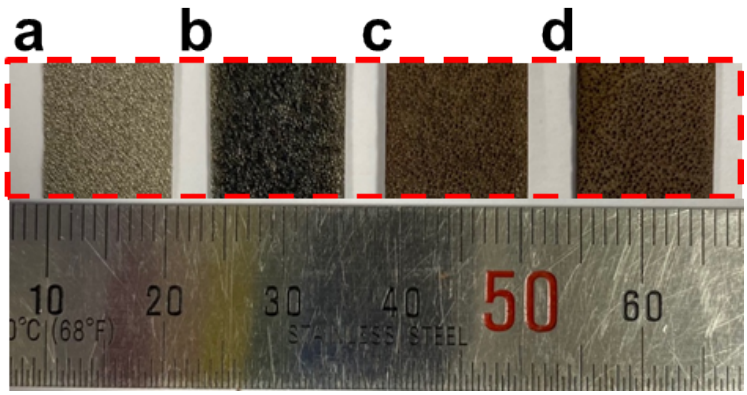

Fig.S1 Optical photographs of catalysts (a) bare NF, (b) $Ni(OH)_2$/NF, (c) CoMn-LDH/NF, and (d) $Ni(OH)_2$@CoMn-LDH/NF.

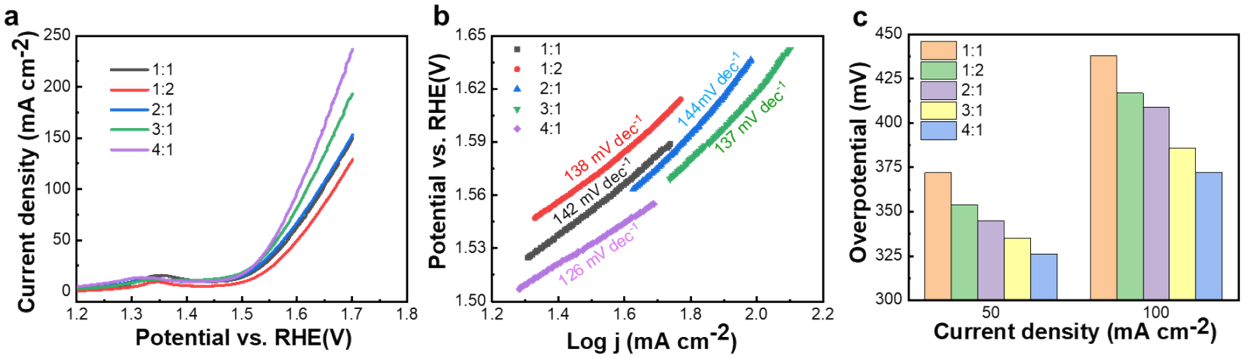

Fig. S2 (a) OER polarization curves at a scan rate of 1 mV s^{-1}, (b) Corresponding Tafel plots, (c) Overpotential values at the current density of 50 and 100 mA cm^{-2} with various molar ratios of Co: Mn of CoMn-LDH in 1 M KOH.

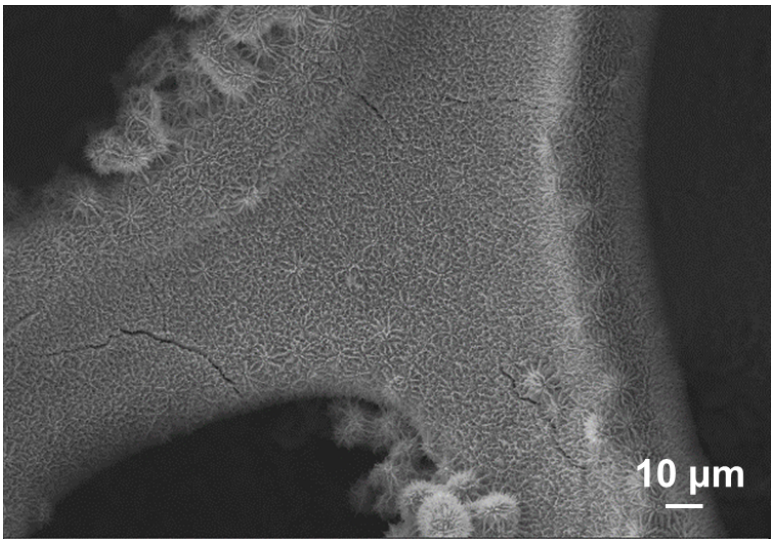

Fig. S3. FE-SEM image of $Ni(OH)_2$@CoMn-LDH nanowires at low magnification.

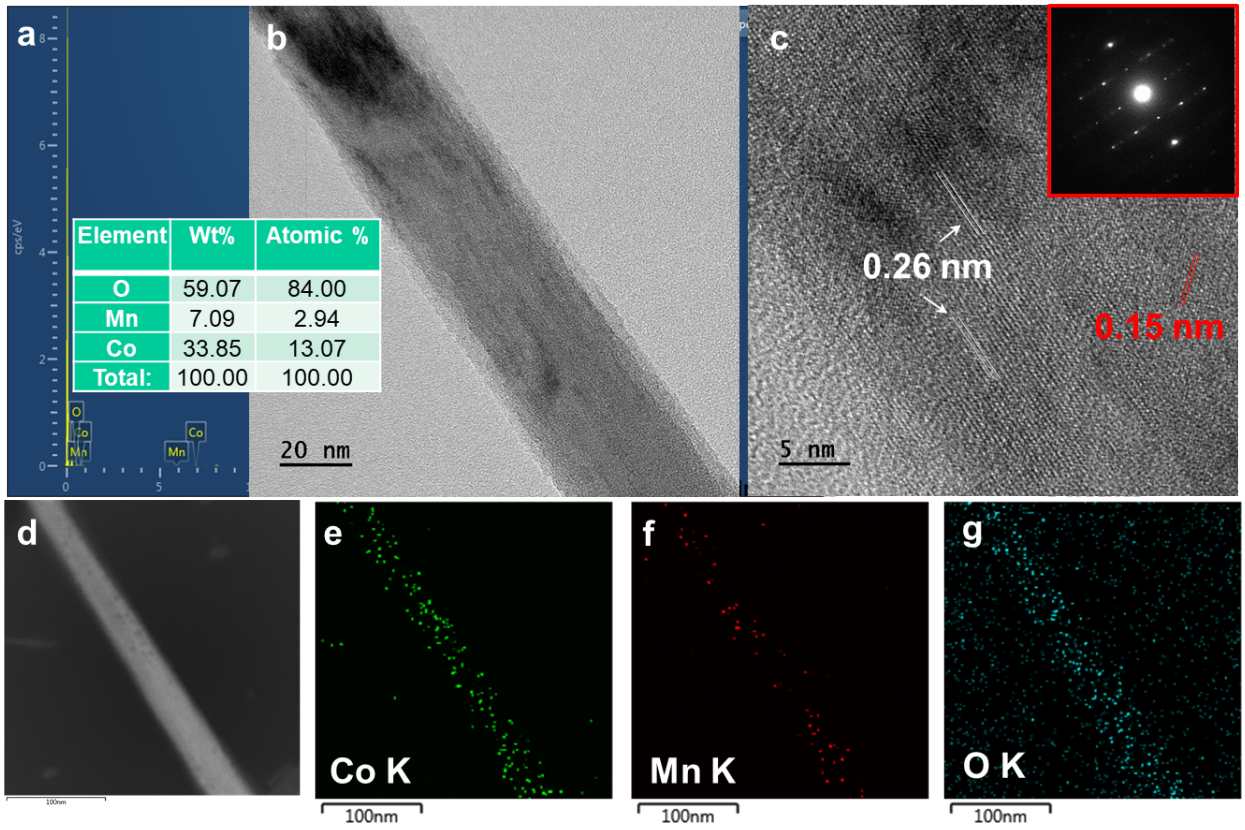

Fig. S4 (a) EDS spectrum (b) TEM image (c) HRTEM image and inset is SAED pattern (d-g) Elemental mapping images for CoMn-LDH nanowires.

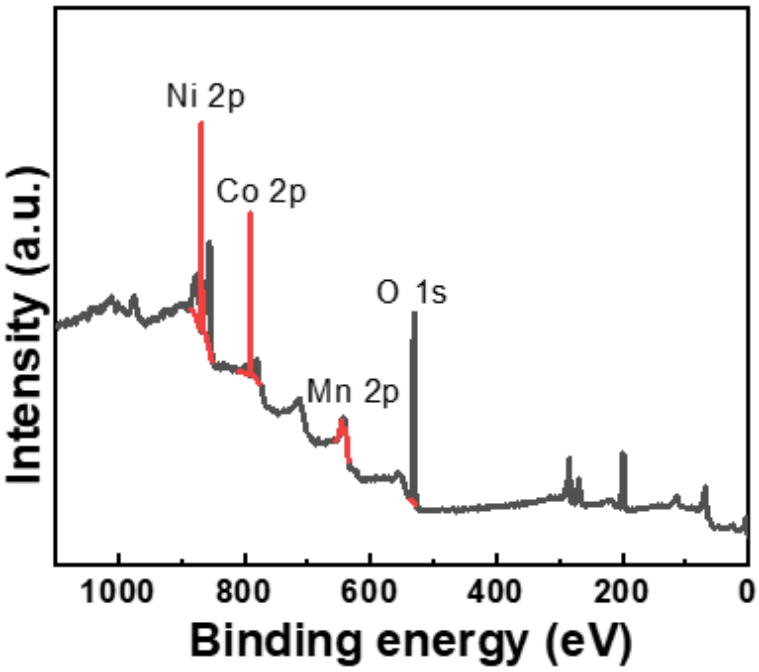

Fig. S5 XPS survey spectrum of $Ni(OH)_2$@CoMn-LDH/NF.

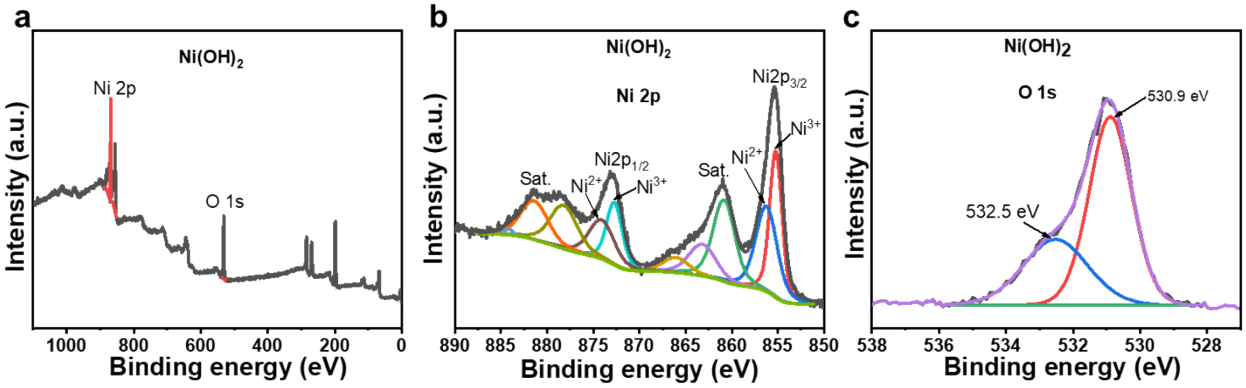

Fig. S6 XPS spectra of $Ni(OH)_2$/NF. (a) XPS survey spectrum and high-resolution XPS spectra of (b) Ni 2p, and (c) O 1s.

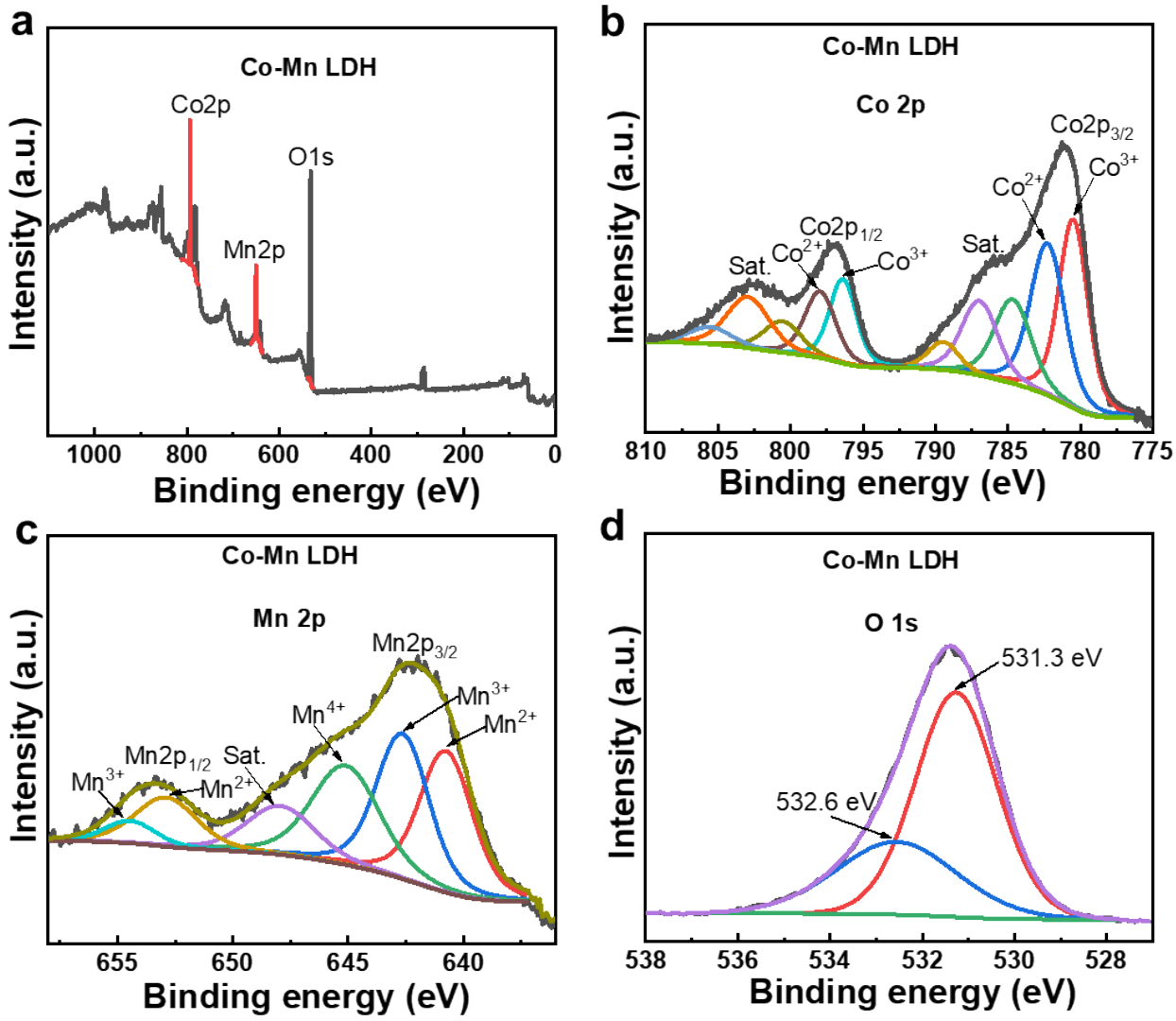

Fig. S7 XPS spectra of CoMn-LDH/NF. (a) XPS survey spectrum and high-resolution XPS spectra of (b) Co 2p, (c) Mn 2p, and (d) O 1s.

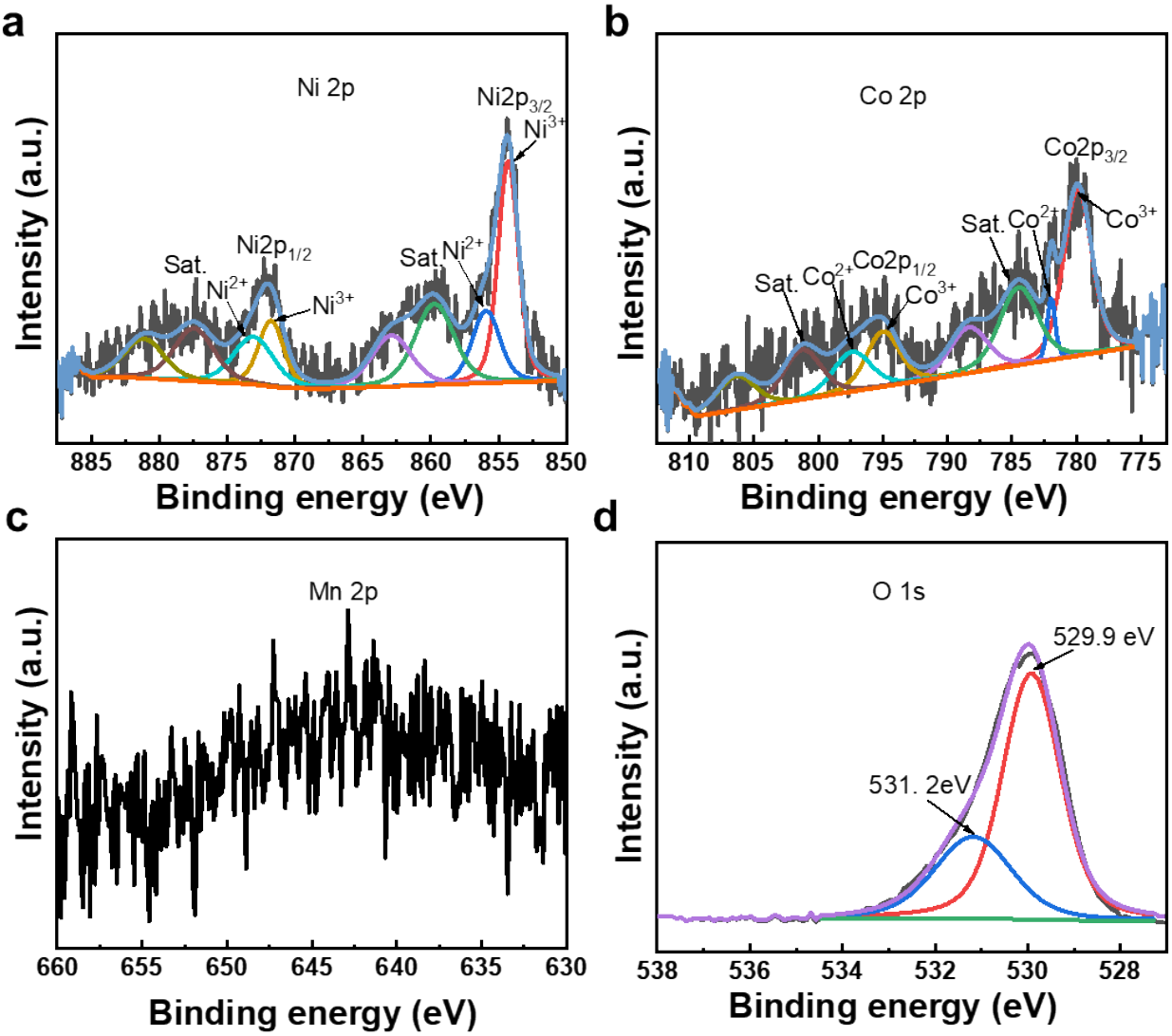

Fig. S8 High-resolution XPS spectra of $Ni(OH)_2$@CoMn-LDH/NF after 25 h stability test. (a) Ni 2p, (b) Co 2p, (c) Mn 2p, and (d) O 1s.

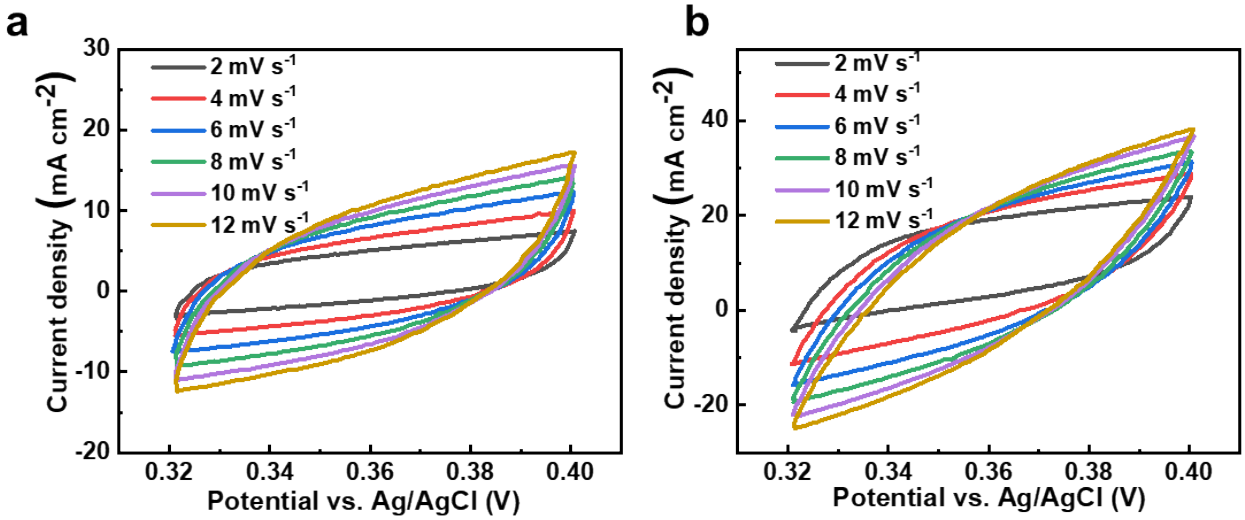

Fig. S9 CV curves at different scan rates of (a) CoMn-LDH, and (b) $Ni(OH)_2$.

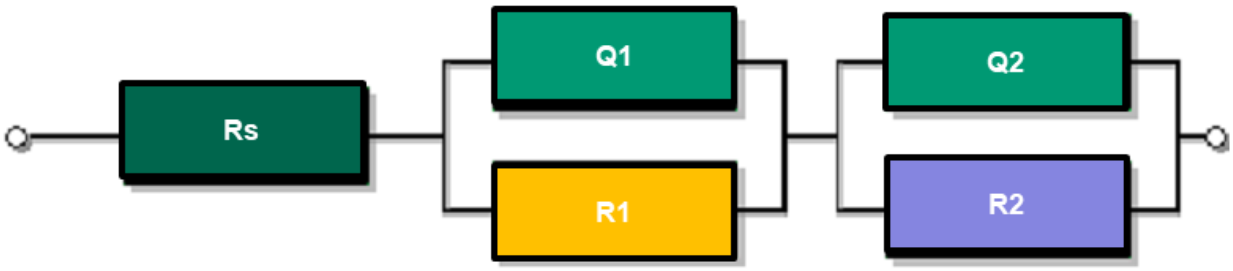

Fig. S10 The equivalent circuit for the simulation of EIS

Table S1 Comparison of OER performances of various LDH-based catalysts in alkaline solution previously reported OER electrocatalysts

Electrocatalysts	Substrate	Electrolyte	Overpotential (mV) [a]	Ref.
CoMn-LDH	NF [b]	1 M KOH	326 [c]	This work
$Ni(OH)_2$@CoMn-LDH	NF	1 M KOH	250 [c]	This work
CoMn LDH	GC [d]	1 M KOH	324	1
CoMn LDH	-	1 M KOH	325	2
CoMn LDH/g-C_3N_4	-	1 M KOH	350 [e]	2
CoMn-LDH/MWCNT [d]	-	1 M KOH	300	3
CoMn-LDH	-	0.1 M KOH	386	4
CoMn LDH/CNT	-	0.1 M KOH	355	4
CoFe LDH	NF	1 M KOH	300	5
NiFe LDH	GC	1M KOH	375	6
NiFe LDH/CNT	GC	1 M KOH	320	7
NiMn LDH/$NiCo_2O_4$	NF	1 M KOH	310	8
Ni_3Mn_1 LDH	RDE [f]	1 M KOH	350	9
Ni_5Mn LDH/MWCNT	RDE	1 M KOH	350	9
CoNi LDH	CP [g]	1 M KOH	367	10
CoNi LDH	ITO [h]	1M KOH	333	11

Overpotential (mV) [a]: at 10 mA cm^{-2}

NF [b]: Ni Foam

326 [c]: at 30 mA cm^{-2}

GC [d]: Glass Carbon

350 [e]: at 39.23 mA cm^{-2}

RDE [f]: Rotating Disk Electrode

CP [g]: Carbon Paper

ITO [h]: Indium Tin Oxide

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