Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Figures

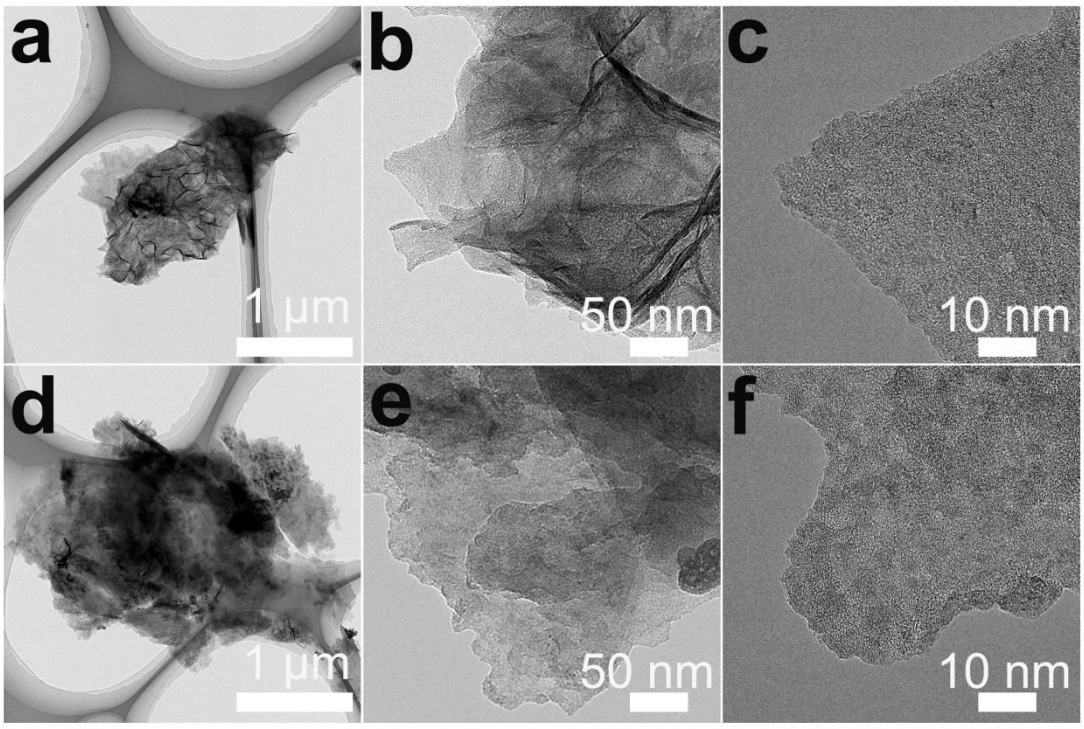

Fig. S1. Low- and high-magnified TEM images of (a-c) CeLDH/NF and (d-f) CeLDH@GDY/NF.

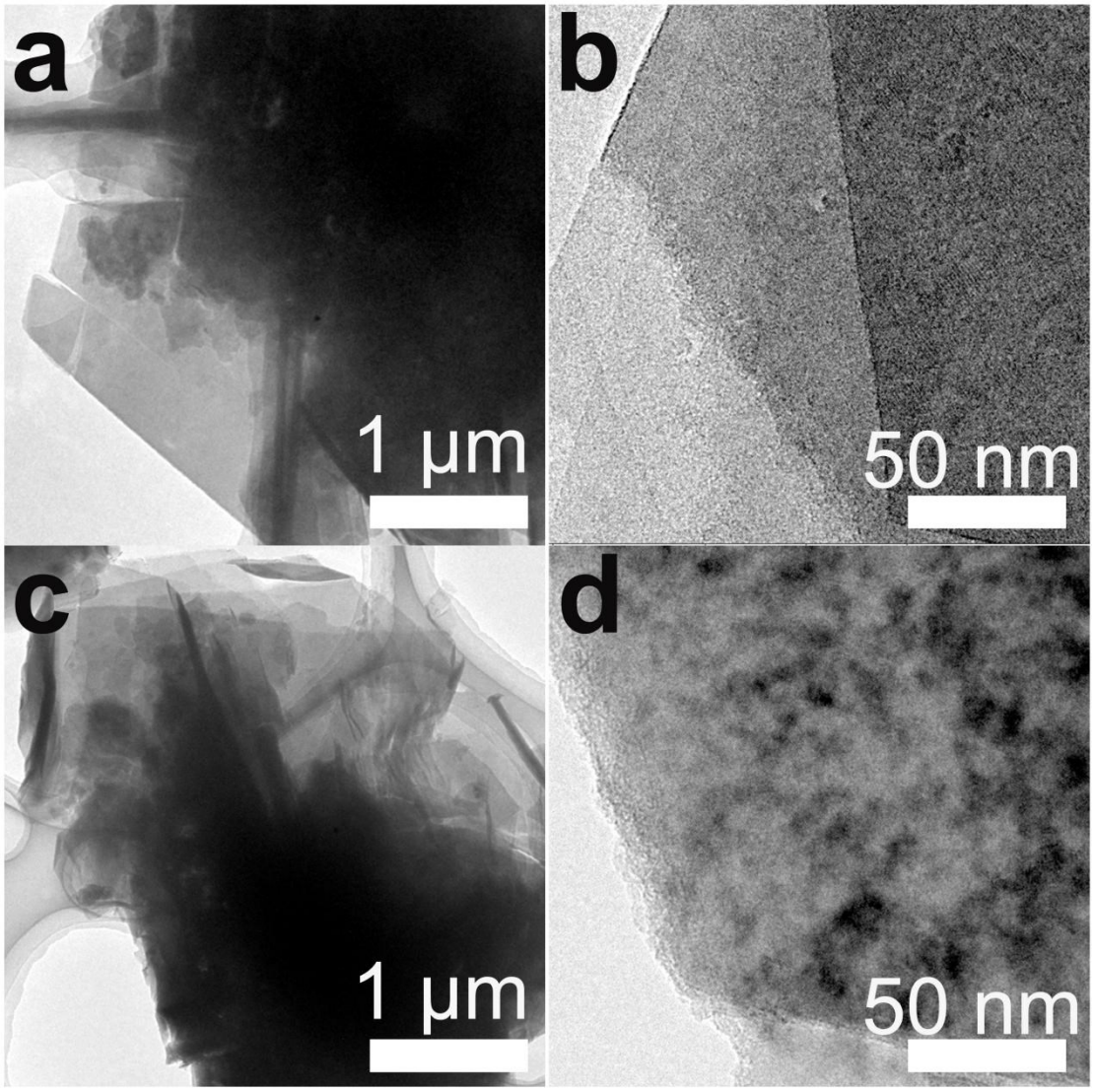

Fig. S2. Low- and high-magnified TEM images of (a-b) NiLDH/NF and (c-d) NiLDH@GDY/NF.

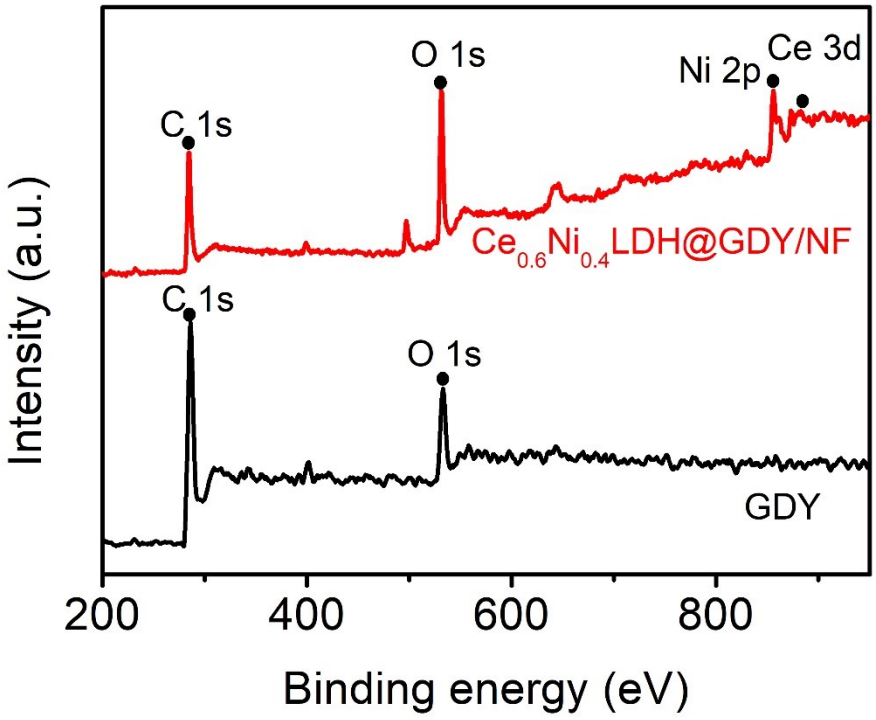

Fig. S3. XPS survey spectra of GDY (black line) and $Ce_{0.6}Ni_{0.4}$LDH@GDY/NF (red line).

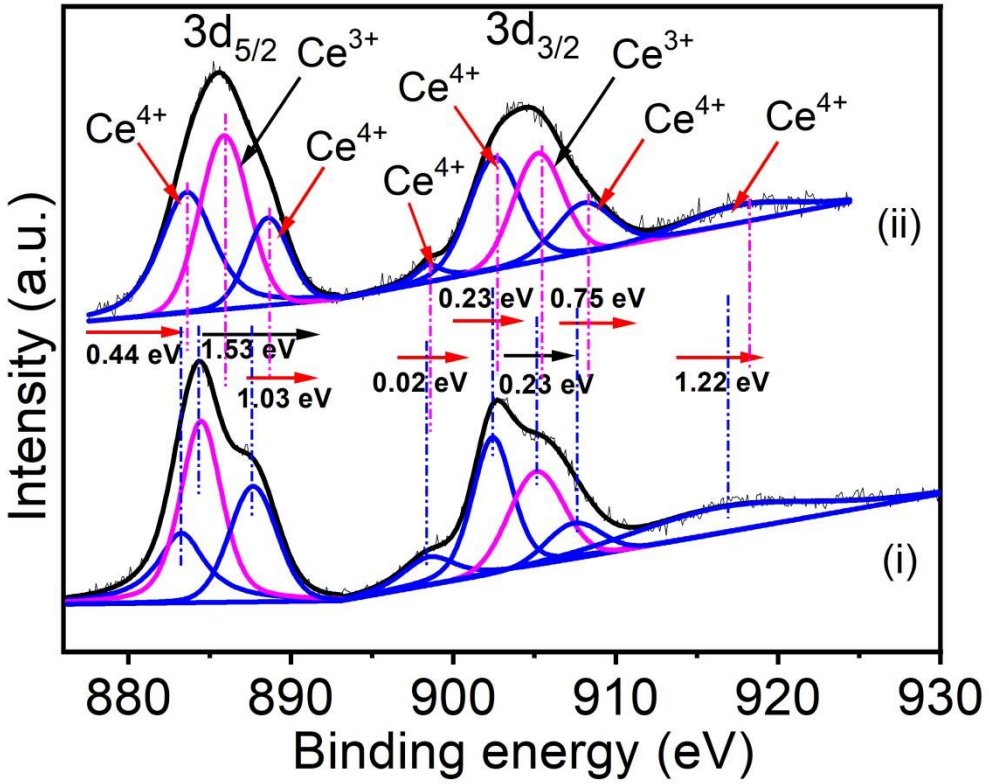

Fig. S4. Ce 3d XPS spectra for the catalyst of (i) $Ce_{0.6}Ni_{0.4}$LDH@GDY and (ii) $Ce_{0.6}Ni_{0.4}$LDH@GDY/NF.

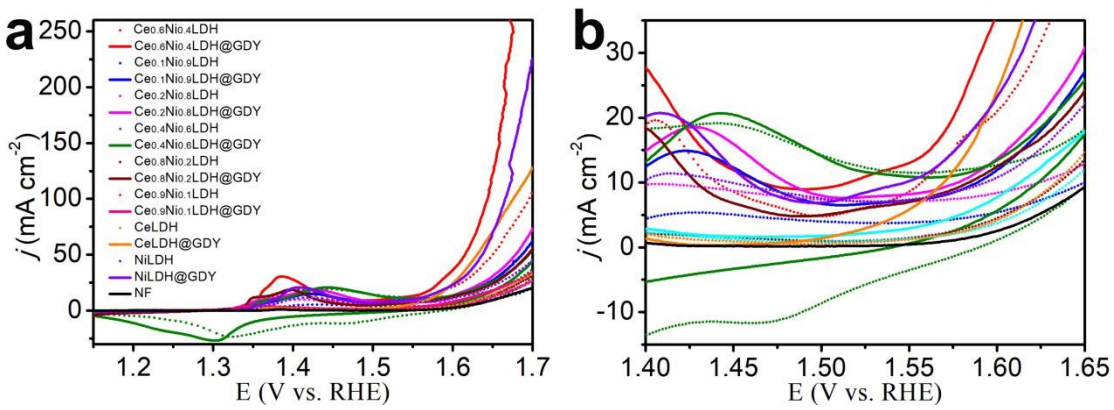

Fig. S5. (a) Polarization curves for Ce_xNi_{1-x}LDH/NF, Ce_xNi_{1-x}LDH@GDY/NF and NF. (b) Magnifications of Ce_xNi_{1-x}LDH/NF, Ce_xNi_{1-x}LDH@GDY/NF and NF curves.

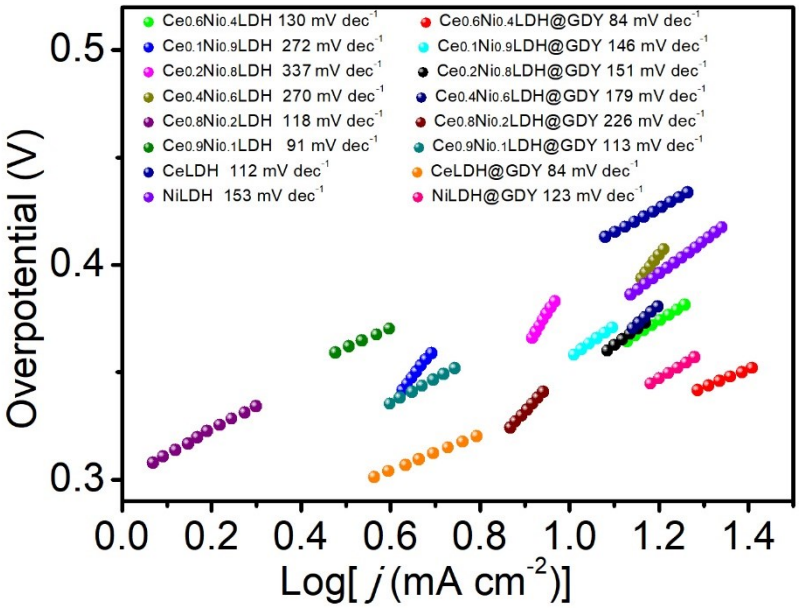

Fig. S6. Tafel plots of the as-synthesized catalysts.

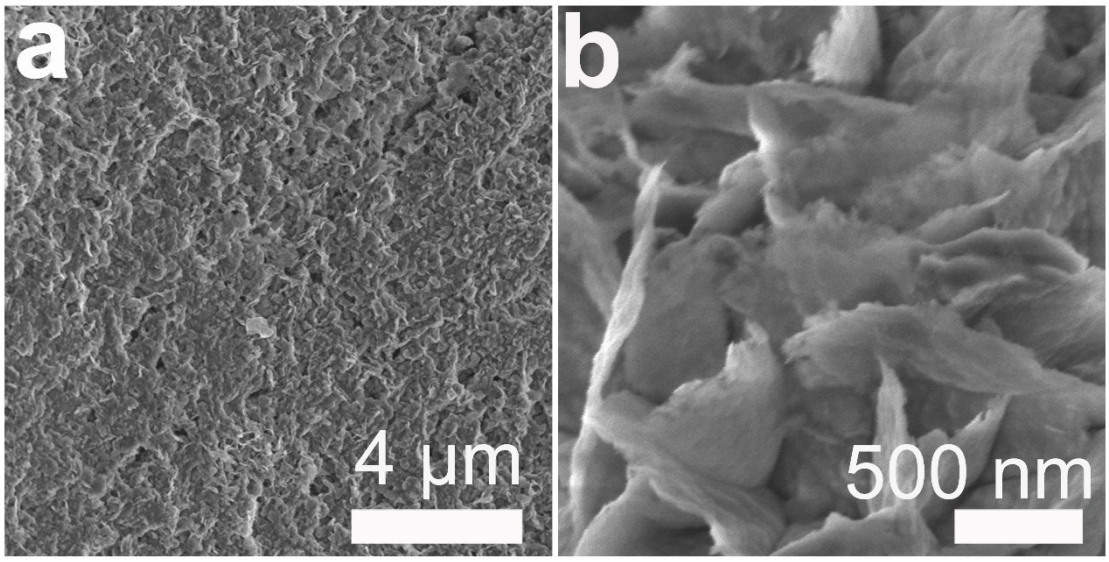

Fig. S7. (a) Low- and (b) high-magnification SEM images of $Ce_{0.6}Ni_{0.4}$LDH@GDY/NF recorded after OER cycling tests in 1.0 M KOH.

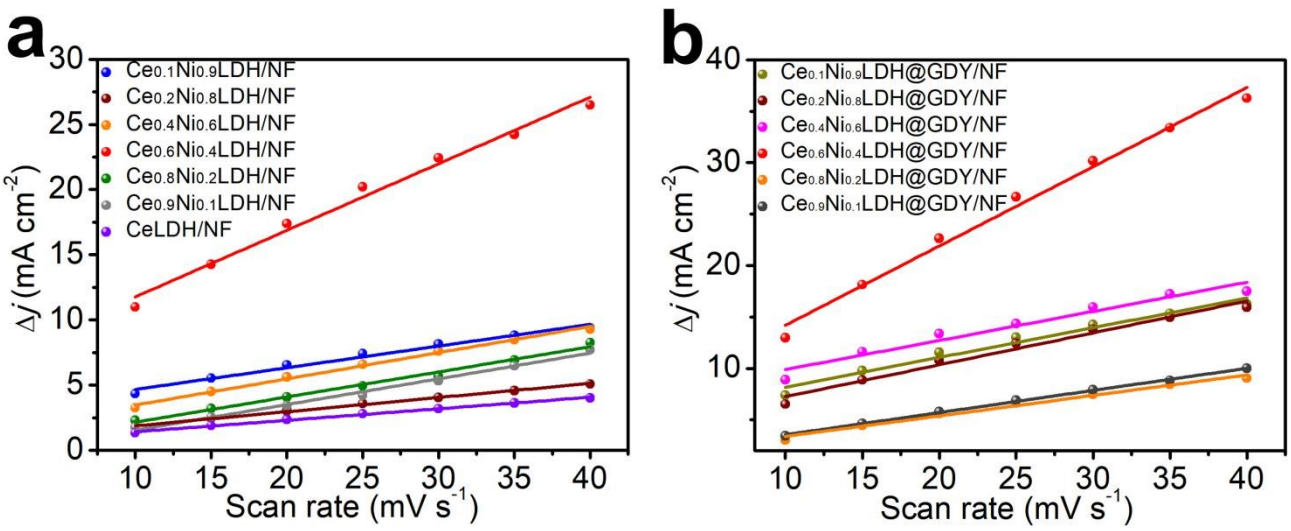

Fig. S8. Electrical-double-layer capacitances (Cdl) on the scan rates of Ce_xNi_{1-x}LDH/NF (a) and Ce_xNi_{1-x}LDH@GDY/NF (b).

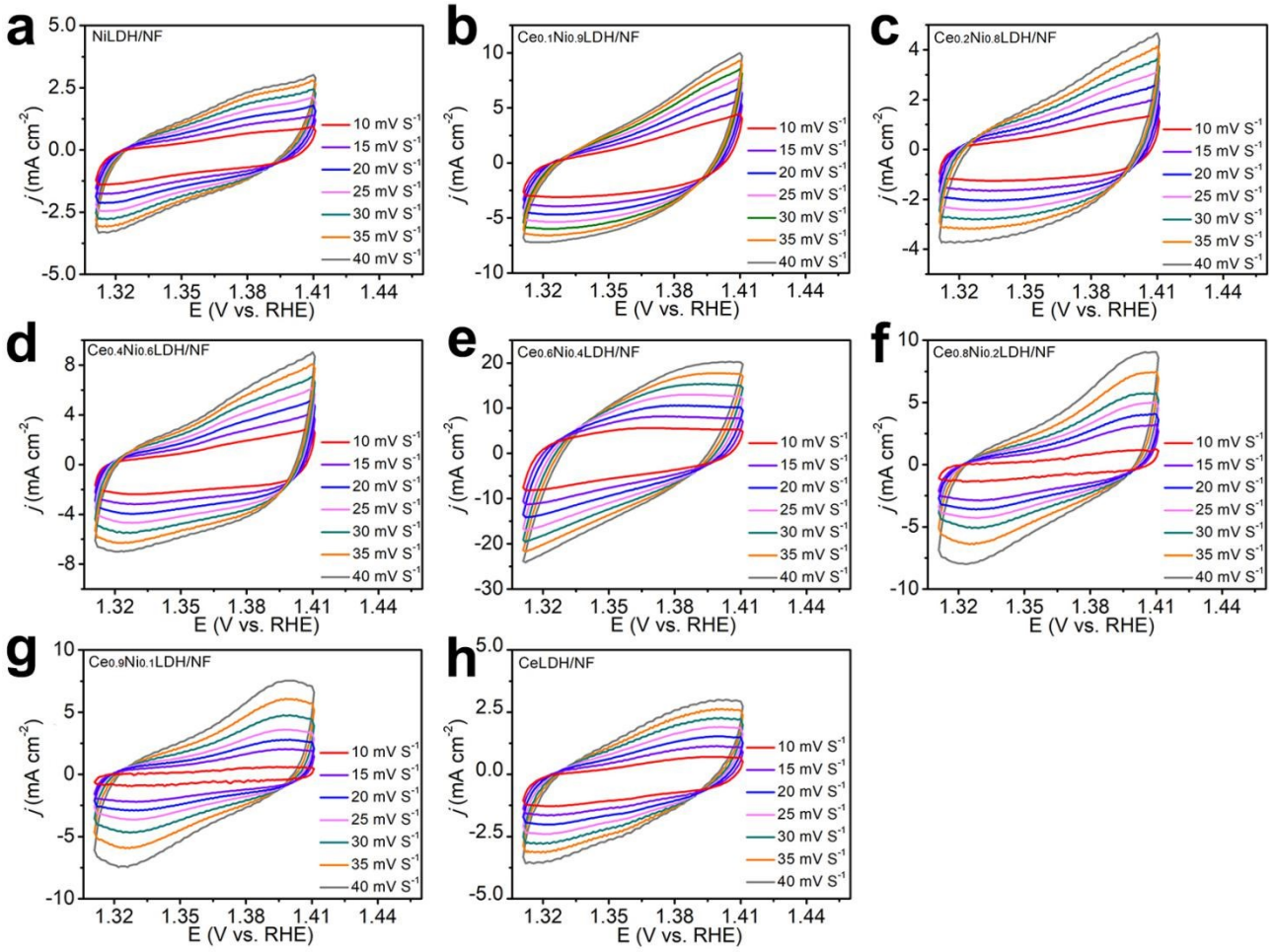

Fig. S9. CV curves of (a) NiLDH/NF, (b) $Ce_{0.1}Ni_{0.9}$LDH/NF, (c) $Ce_{0.2}Ni_{0.8}$LDH/NF, (d) $Ce_{0.4}Ni_{0.6}$LDH/NF, (e) $Ce_{0.6}Ni_{0.4}$LDH/NF, (f) $Ce_{0.8}Ni_{0.2}$LDH/NF, (g) $Ce_{0.9}Ni_{0.1}$LDH/NF and (h) NiLDH/NF of 10, 15, 20, 25, 30, 35, 40 mV S^{-1}, respectively.

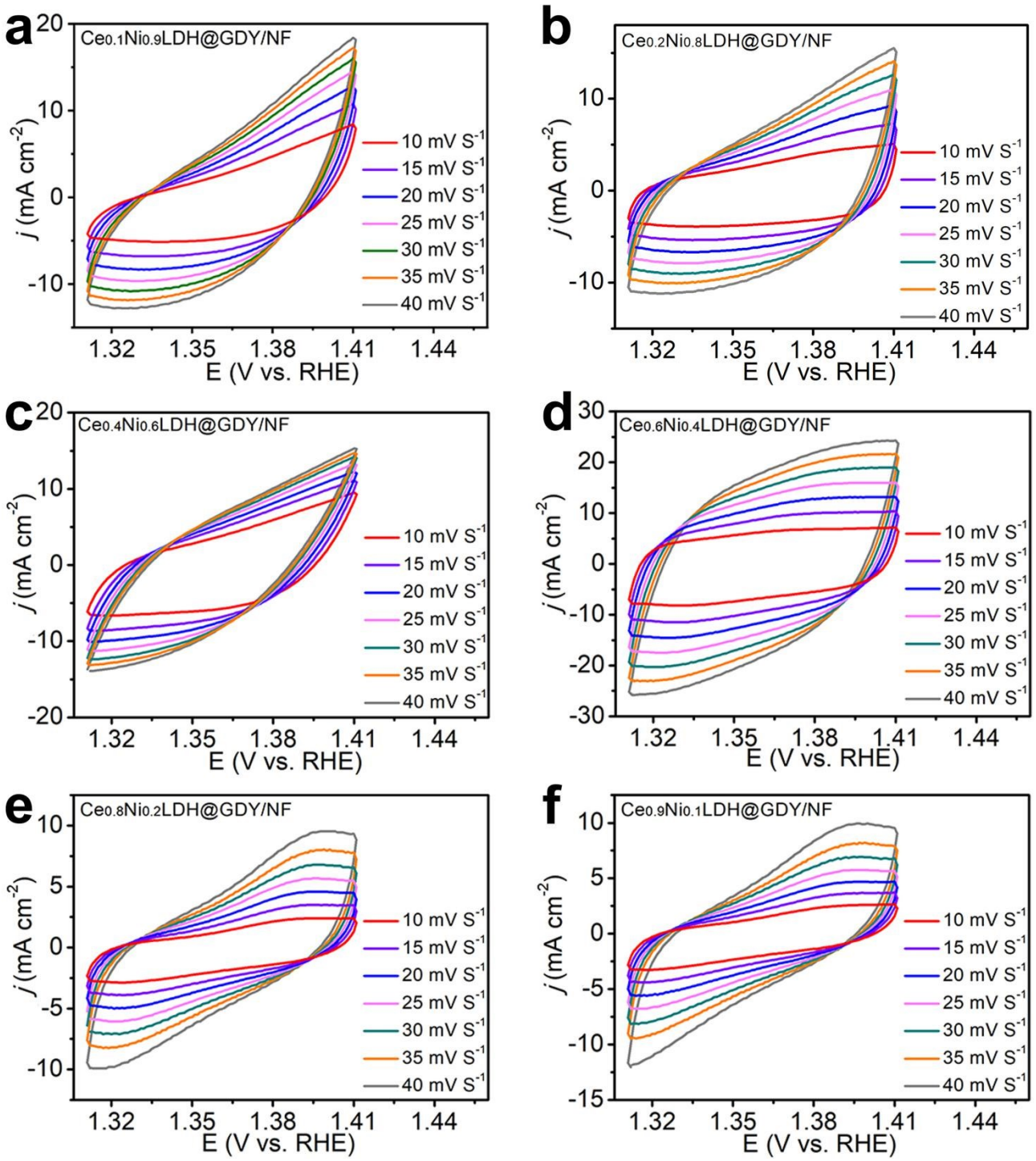

Fig. S10. CV curves of (a) $Ce_{0.1}Ni_{0.9}$LDH@GDY/NF, (b) $Ce_{0.2}Ni_{0.8}$LDH@GDY/NF, (c) $Ce_{0.4}Ni_{0.6}$LDH@GDY/NF, (d) $Ce_{0.6}Ni_{0.4}$LDH@GDY/NF, (e) $Ce_{0.8}Ni_{0.2}$LDH@GDY/NF, and (f) $Ce_{0.9}Ni_{0.1}$LDH@GDY/NF of 10, 15, 20, 25, 30, 35, 40 mV S^{-1}, respectively.

Table S1. The OER overpotential of catalysts at different current densities.

Catalyst	η 10 mA cm^{-2}	η 20mA cm^{-2}	η 40 mA cm^{-2}	η 60 mA cm^{-2}
$Ce_{0.6}Ni_{0.4}$LDH@GDY/NF	283	342	372	390
$Ce_{0.6}Ni_{0.4}$LDH/NF	324	364	404	428
$Ce_{0.1}Ni_{0.9}$LDH@GDY/NF	356	398	440	465
$Ce_{0.1}Ni_{0.9}$LDH/NF	418	467	511	538
$Ce_{0.2}Ni_{0.8}$LDH@GDY/NF	344	390	433	456
$Ce_{0.2}Ni_{0.8}$LDH/NF	392	450	493	518
$Ce_{0.4}Ni_{0.6}$LDH@GDY/NF	391	397	448	473
$Ce_{0.4}Ni_{0.6}$LDH/NF	420	426	473	497
$Ce_{0.8}Ni_{0.2}$LDH@GDY/NF	351	405	448	473
$Ce_{0.8}Ni_{0.2}$LDH/NF	403	438	486	520
$Ce_{0.9}Ni_{0.1}$LDH@GDY/NF	381	426	481	513
$Ce_{0.9}Ni_{0.1}$LDH/NF	409	446	501	539
CeLDH@GDY/NF	337	361	387	407
CeLDH/NF	401	434	487	537
NiLDH@GDY/NF	300	359	395	415
NiLDH/NF	361	411	459	487
RuO_2/NF	334	382	464	527
NF	422	466	559	625

Table S2. The tafel slope of electrocatalysts.

Catalyst	Tafel Slope (mV dec^{-1})
$Ce_{0.6}Ni_{0.4}$LDH@GDY/NF	84
$Ce_{0.6}Ni_{0.4}$LDH/NF	130
$Ce_{0.1}Ni_{0.9}$LDH@GDY/NF	146
$Ce_{0.1}Ni_{0.9}$LDH/NF	272
$Ce_{0.2}Ni_{0.8}$LDH@GDY/NF	151
$Ce_{0.2}Ni_{0.8}$LDH/NF	337
$Ce_{0.4}Ni_{0.6}$LDH@GDY/NF	179
$Ce_{0.4}Ni_{0.6}$LDH/NF	270
$Ce_{0.8}Ni_{0.2}$LDH@GDY/NF	226
$Ce_{0.8}Ni_{0.2}$LDH/NF	118
$Ce_{0.9}Ni_{0.1}$LDH@GDY/NF	113
$Ce_{0.9}Ni_{0.1}$LDH/NF	91
CeLDH@GDY/NF	84
CeLDH/NF	112
NiLDH@GDY/NF	123
NiLDH/NF	153
RuO_2/NF	74.7

Table S3. Comparison of the OER performance of $Ce_{0.6}Ni_{0.4}$LDH@GDY/NF with reported electrocatalysts

Catalyst	Electrolytes	η (mV) at 10 mA cm^{-2}	Ref.
$Ce_{0.6}Ni_{0.4}$LDH@GDY/NF	1 M KOH	283	This work
10% F/BCN	0.5 M NaOH	390	J. Am. Chem. Soc. 2021, 143, 2, 1203-1215
HXP@NC800	1 M KOH	307	J. Am. Chem. Soc. 2020, 142, 7317−7321
Co− N−C on CC	1 M KOH	321	J. Am. Chem. Soc. 2019, 141, 14190−14199
$LaFexNi_{1-x}O_3$	1 M KOH	302	Angew. Chem. Int. Ed. 2019, 58, 2316.
Co_3O_4/Co-Fe oxide DSNBs	1 M KOH	297	Adv. Mater. 2018, 30, 1801211.
CoNi/$CoNiO_2$	1 M KOH	341	Adv. Mater. 2018, 30, 1705442.
CoN_x/CoO_x	0.1 M KOH	350	Adv. Mater. 2018, 30, 1705431.
$Co_3O_4/CoFeO_x$	1 M KOH	297	Adv. Mater. 2018, 30, 1801211.
NiCoPO/NC	1.0 M KOH	300	Nano Energy 2020, 69, 104453
Ni-CoP	1 M KOH	290	Nano Lett. 2021, 21, 823-832
MnSAC	0.1 M KOH	350	Nano Lett. 2020, 20, 5443−5450
Co/Co_3O_4	1 M KOH	333	ACS Catal. 2018, 8, 7879-7888.

Table S4. The electrochemical active surface areas (ECSAs) and electrical-double-layer capacitances (C_{dl}) values of the catalysts.

Catalyst	C_{dl} (mF cm^{-2})	ECSA (cm^2)
$Ce_{0.1}Ni_{0.9}$LDH@GDY/NF	144.3	721.5
$Ce_{0.2}Ni_{0.8}$LDH@GDY/NF	155.1	775.5
$Ce_{0.4}Ni_{0.6}$LDH@GDY/NF	141.5	707.5
$Ce_{0.6}Ni_{0.4}$LDH@GDY/NF	385.2	1926
$Ce_{0.8}Ni_{0.2}$LDH@GDY/NF	99.6	498
$Ce_{0.9}Ni_{0.1}$LDH@GDY/NF	107.7	538.5
NiLDH/NF	34.9	174.5
CeLDH/NF	44.2	221
$Ce_{0.1}Ni_{0.9}$LDH/NF	83.2	416
$Ce_{0.2}Ni_{0.8}$LDH/NF	50.4	303
$Ce_{0.4}Ni_{0.6}$LDH/NF	100.8	504
$Ce_{0.6}Ni_{0.4}$LDH/NF	255.1	1275.5
$Ce_{0.8}Ni_{0.2}$LDH/NF	96.3	483
$Ce_{0.9}Ni_{0.1}$LDH/NF	98.6	493