Supporting information

Sulfidation and NaOH etching on CoFeAl LDH evolved catalysts for efficient overall water splitting in alkaline solution

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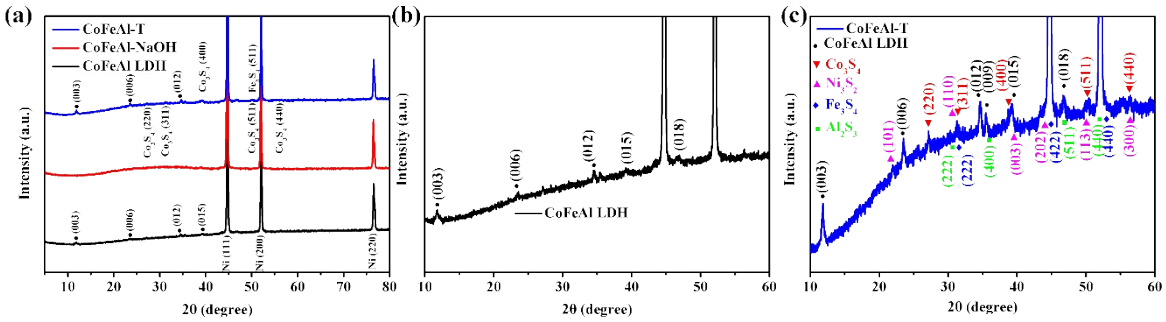
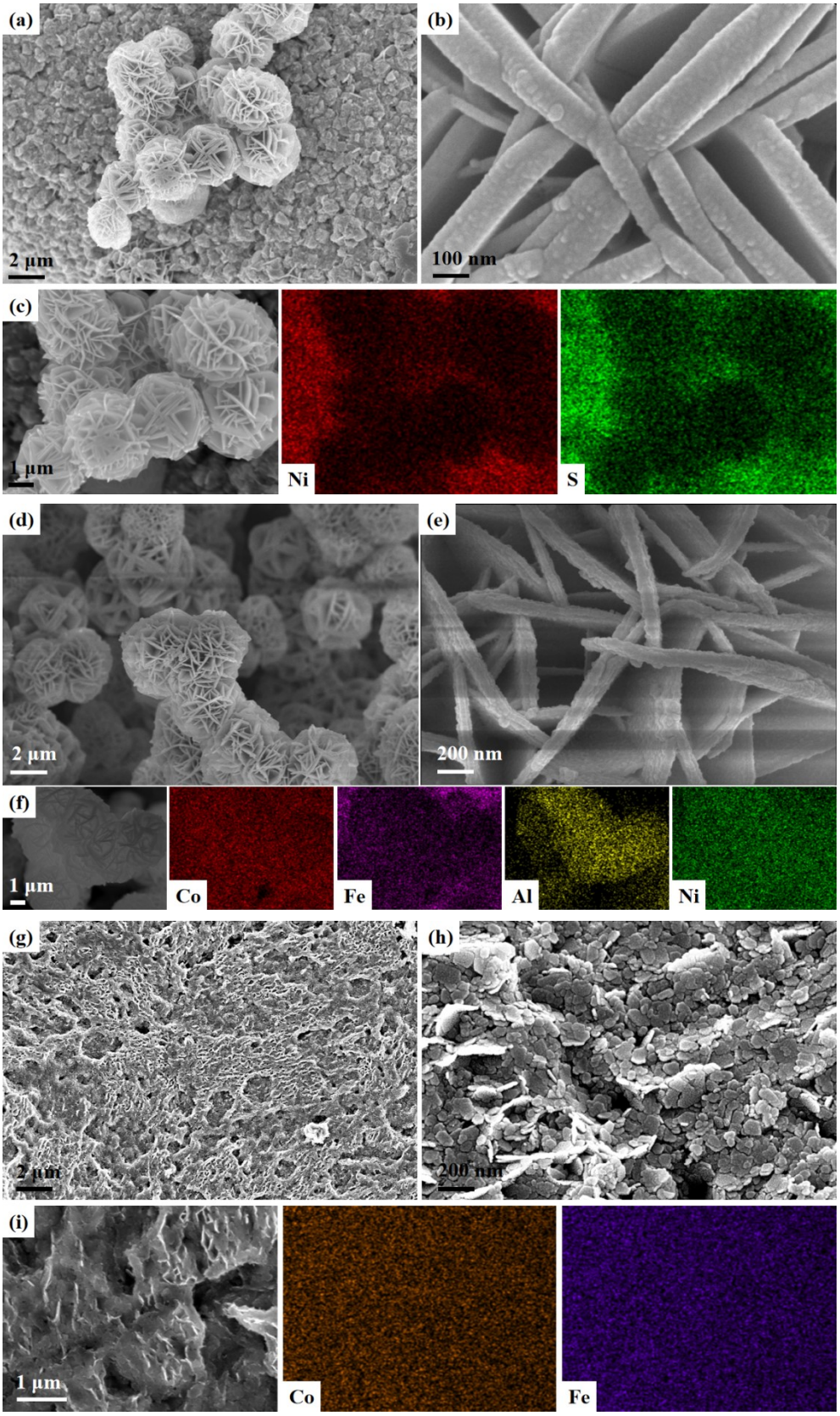


Fig. SI1. (a) XRD patterns of the as-prepared samples: CoFeAl LDH, CoFeAl-NaOH and CoFeAl-T, and the magnified XRD pattern of (b) CoFeAl LDH and (c) CoFeAl-T.


(a)
2 μm
(b)
100 nm
(c)
1 μm
Ni
S
(d)
2 μm
(e)
200 nm
(f)
1 μm
Co
Fe
Al
Ni
(g)
2 μm
(h)
200 nm
(i)
1 μm
Co
Fe

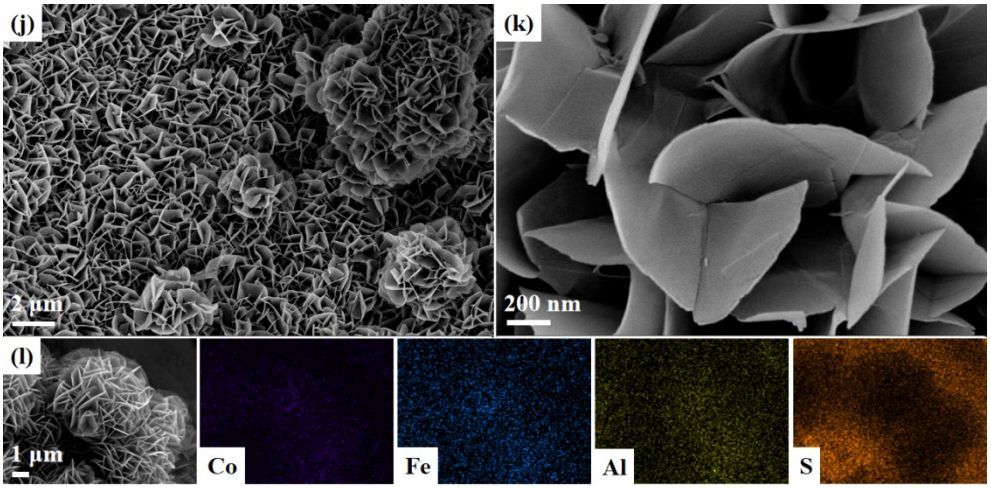


Fig. SI2. SEM images and corresponding elemental mapping images of the as-prepared samples: (a-c) Ni foam-T, (d-f) CoFeAl LDH, (g-i) CoFeAl-NaOH and (j-l) CoFeAl-T.

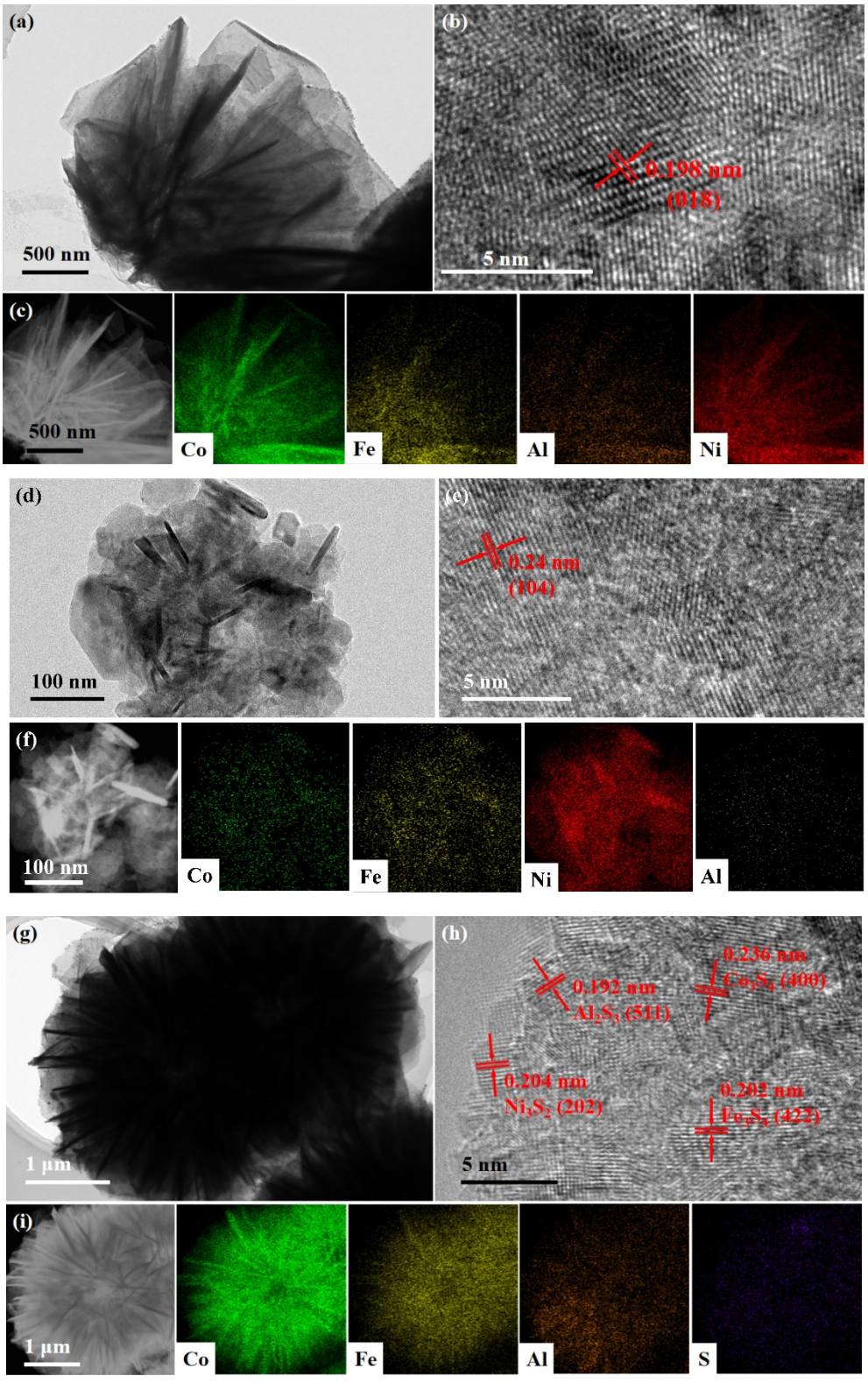


Fig. SI3. TEM image, HRTEM image and corresponding elemental mapping imageS of the as-prepared samples: (a-c) CoFeAl LDH, (d-f) CoFeAl-NaOH and (g-i) CoFeAl-T.

Table SI1 The content of Al in the different catalysts by molar ratio of Fe/Al

Samples	CoFeAl LDH	CoFeAl-T	CoFeAl-NaOH	CoFeAl-T-NaOH	CoFeAl-NaOH-T
Fe/Al	3.9	2.9	6.1	12.7	638.6

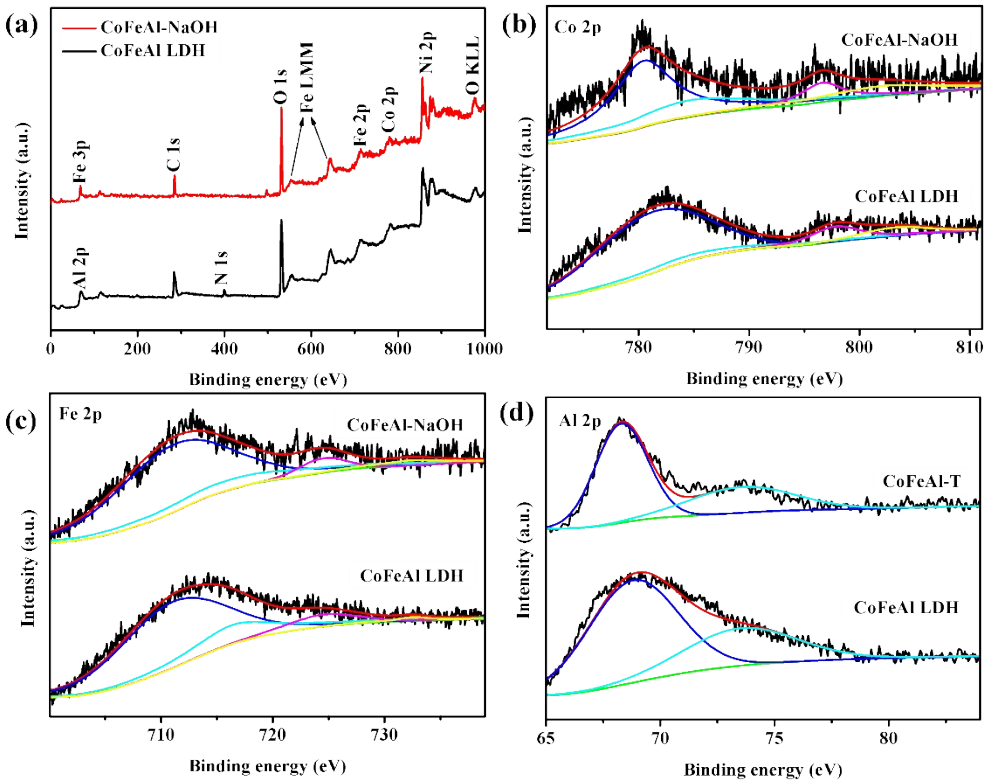


Fig. SI4. XPS analysis of the as-prepared samples: XPS survey spectra (a) High-resolution spectra of (b) Co 2p, Fe 2p (c) and Al 2p (d).

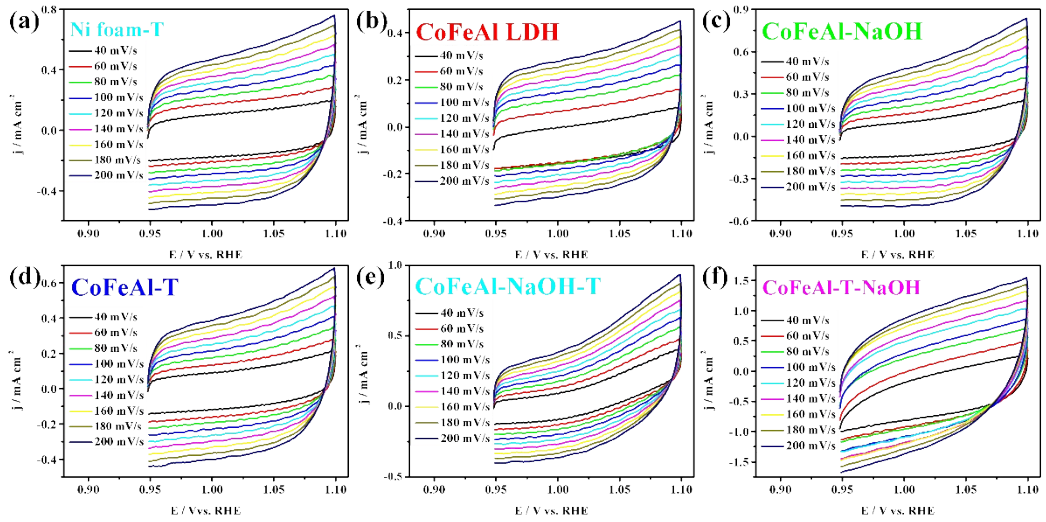


Fig. SI5. CV records with the bias range of 0.948-1.1 V (*vs*. RHE) in 1.0 M KOH by the scan rates of 40, 60, 80, 100, 120, 140, 160, 180, and 200 mV s^{-1} for evaluating the ECSA.

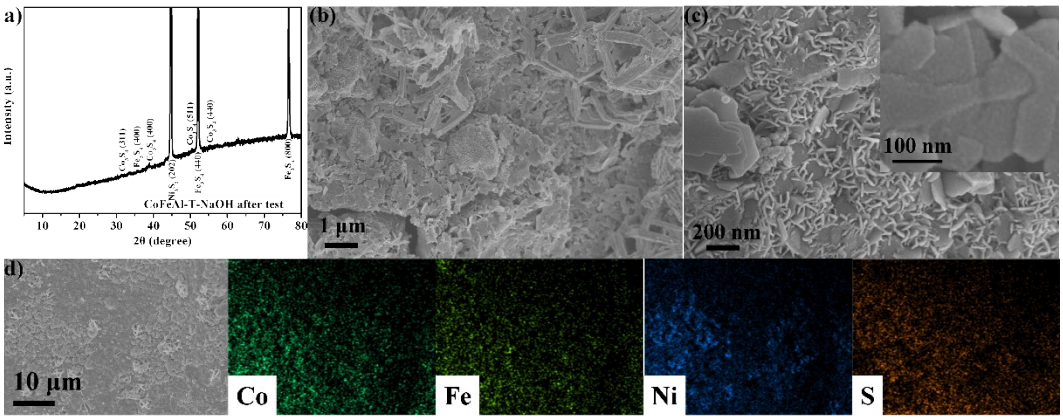


Fig. SI6. XRD pattern, and SEM image and corresponding elemental mapping image, of CoFeAl-T-NaOH after long-term stability test.

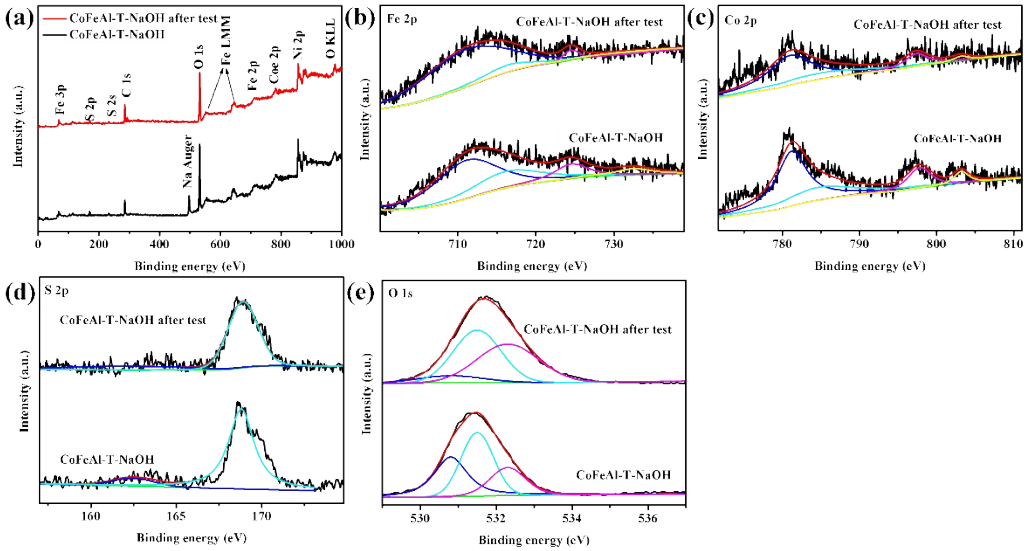


Fig. SI7. XPS spectra of CoFeAl-T-NaOH before and after long-term stability test.

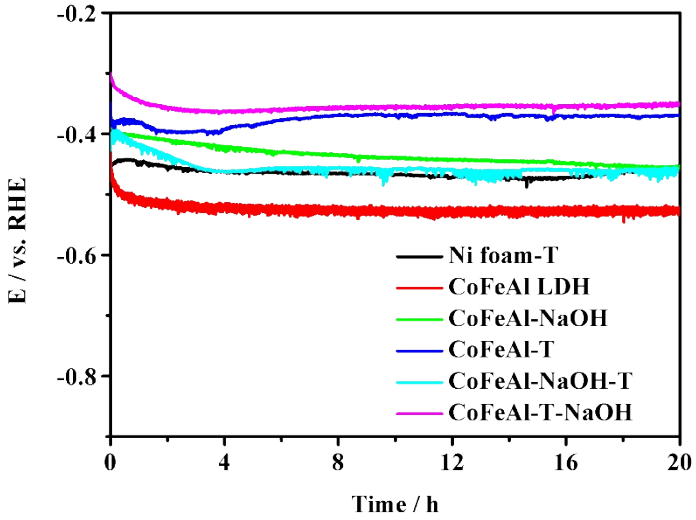


Fig. SI8. Chronopotentiometric curves of the as-prepared samples for HER measured at the current density of 150 mA cm^{-2} for 20 hours.

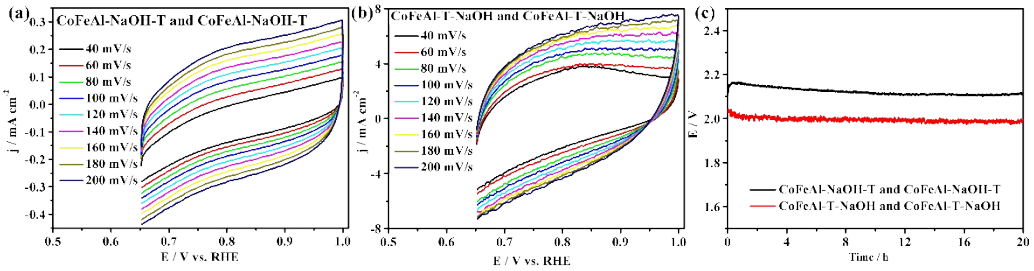


Fig. SI9. (a,b) CV with a bias range of 0.652-1 V (*vs*. RHE) was recorded, and scan rates of 40, 60, 80, 100, 120, 140, 160, 180, and 200 mV s^{-1} were used to evaluate ECSA. (c) Chronopotentiometric curves measured at the current density of 100 mA/cm^{-2} for 20 hours.