Electronic Supplementary Information

Synergistic Effect of Co/CoO Nanoparticles on Imine-based Covalent Organic Framework for Enhanced OER Performance

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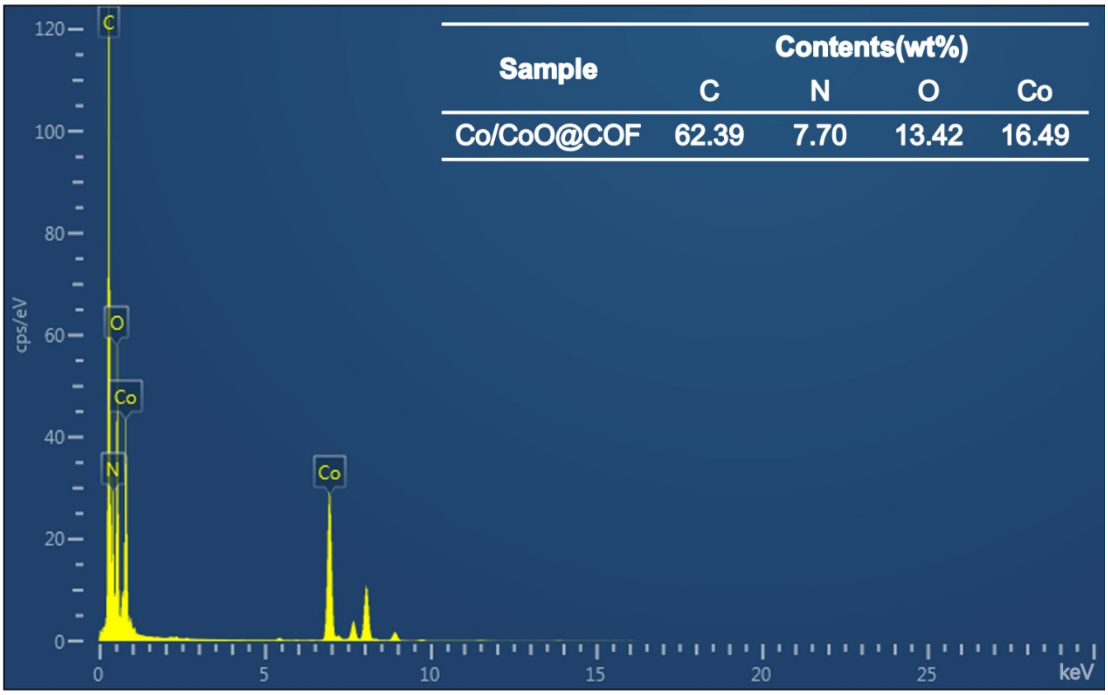

Figure S1. EDS spectrum of Co/CoO@COF.

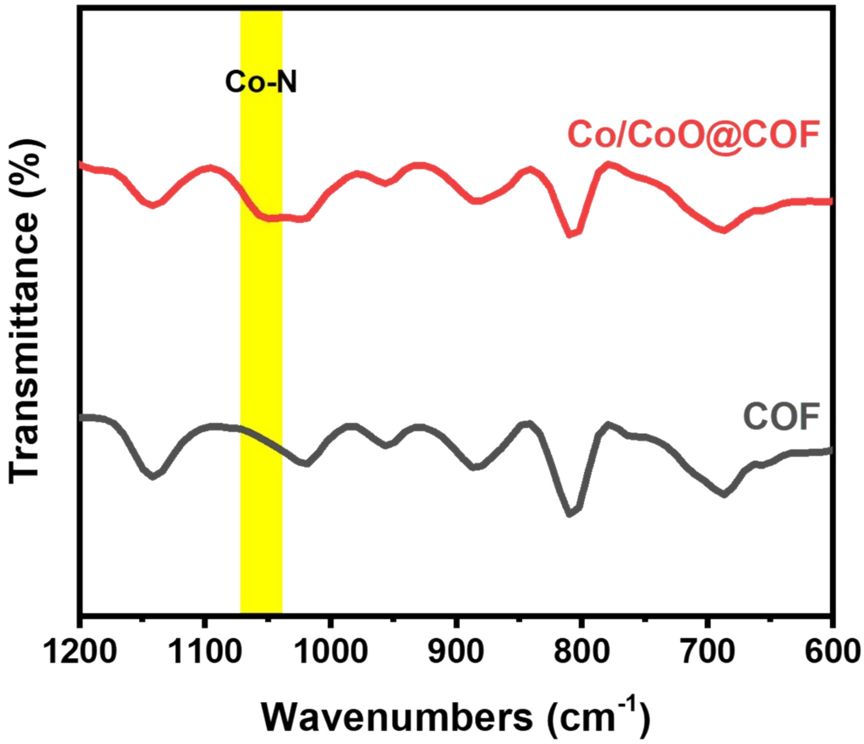

Figure S2. Amplified FTIR spectrum of COF and Co/CoO@COF.

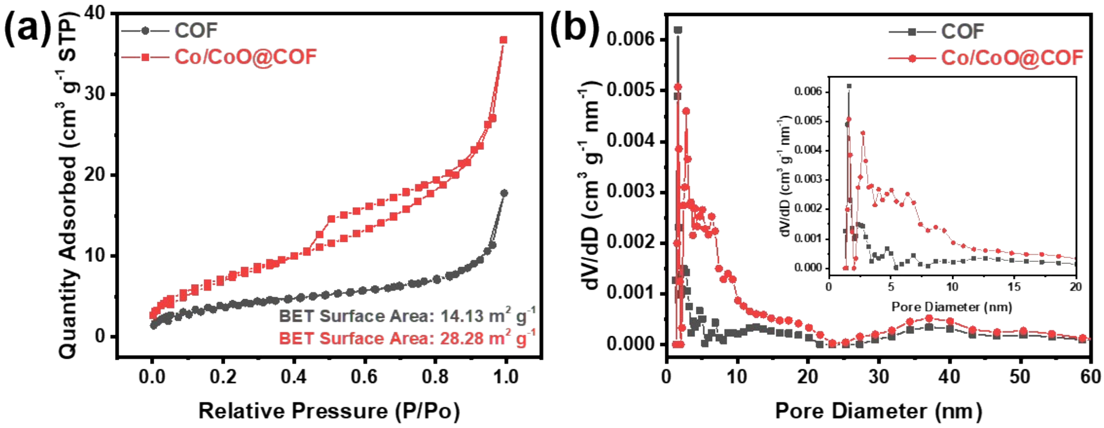

Figure S3. Brunner−Emmet−Teller (BET) analysis via N_2, (a) adsorption-desorption isotherm and (b) pore size distribution diagram of COF and Co/CoO@COF.

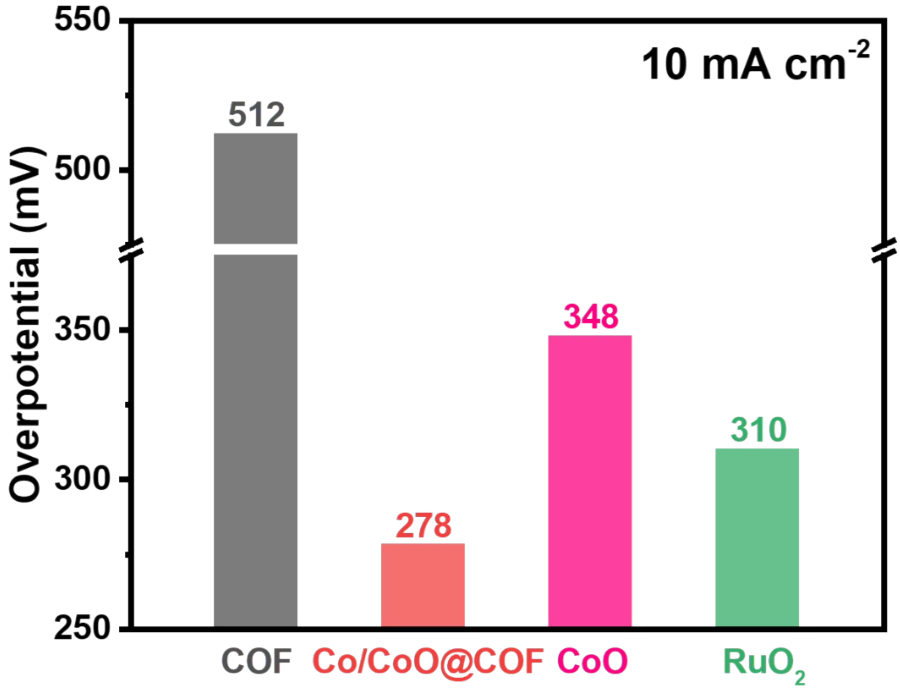

Figure S4. Histogram of overpotential by COF, Co/CoO@COF, CoO and RuO_2 according to the LSV curve at the current density of 10 mA cm^{-2}.

Table S1. Comparison of the activity for the Co/CoO@COF catalyst with recently reported electrocatalysts

Catalyst	η (at 10 mA cm^{-2})	Ref.
Co/CoO@COF	**278 mV**	**This work**
COF-CNT	389 mV	*ACS Nano*, 2021, **15**, 3309-3319
COF-C_4N	349 mV	*ACS Energy Lett.*, 2019, **4**, 2251-2258
BP-CN-c	350 mV	*Adv. Mater.*, 2021, **33**, 2008752
CoOOH HNSs	305 mV	*J. Mater. Chem. A*, 2021, **9**, 3297-3302.
F-Co_3Fe LDH	287 mV	*J. Mater. Chem. A*, 2019, **7**, 14483-14488
O-CoP	310 mV	*Adv. Funct. Mater.*, 2020, **30**, 1905252
Co/N-CNT	310 mV	*Small*, 2020, **16**, 2002427
Fe@BIF-73-NS	291 mV	*Small*, 2020, **16**, 1907669
Pt/NiO/Ni/CNTs	350 mV	*Nanoscale*, 2020, **12**, 14615-14625
Ni-BDC/Ni$(OH)_2$	320 mV	*Nanoscale*, 2019, **11**, 3599-3605
Co_3O_4/Co@NCs	320 mV	*Nano Energy*, 2020, **77**, 105200

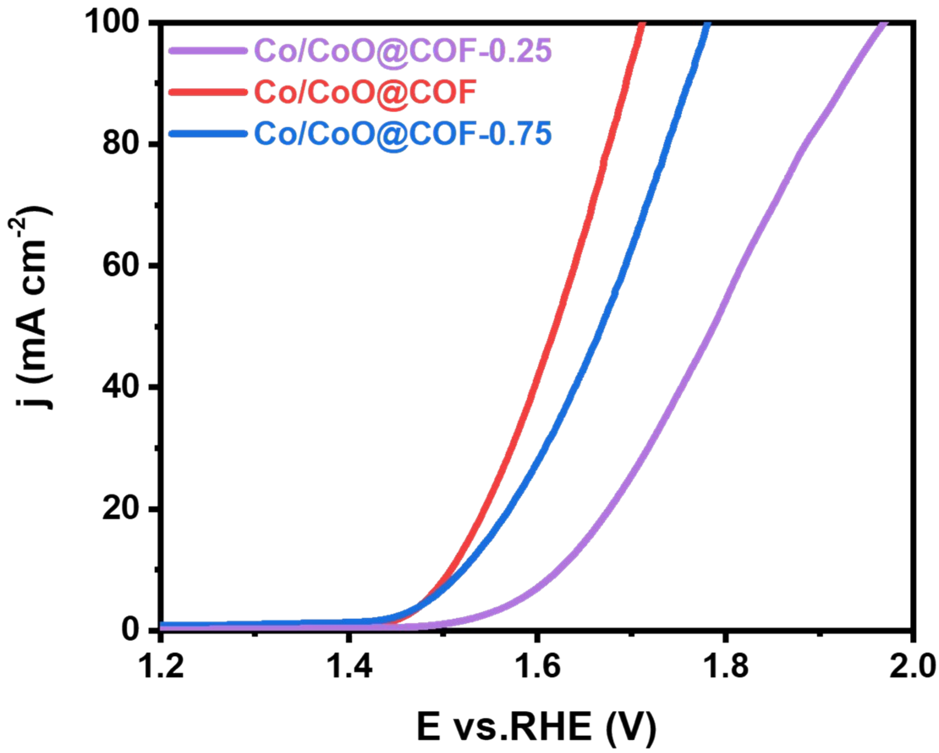

Figure S5. LSV curves of Co/CoO@COF-0.25, Co/CoO@COF and Co/CoO@COF-0.75 at 1 M KOH.

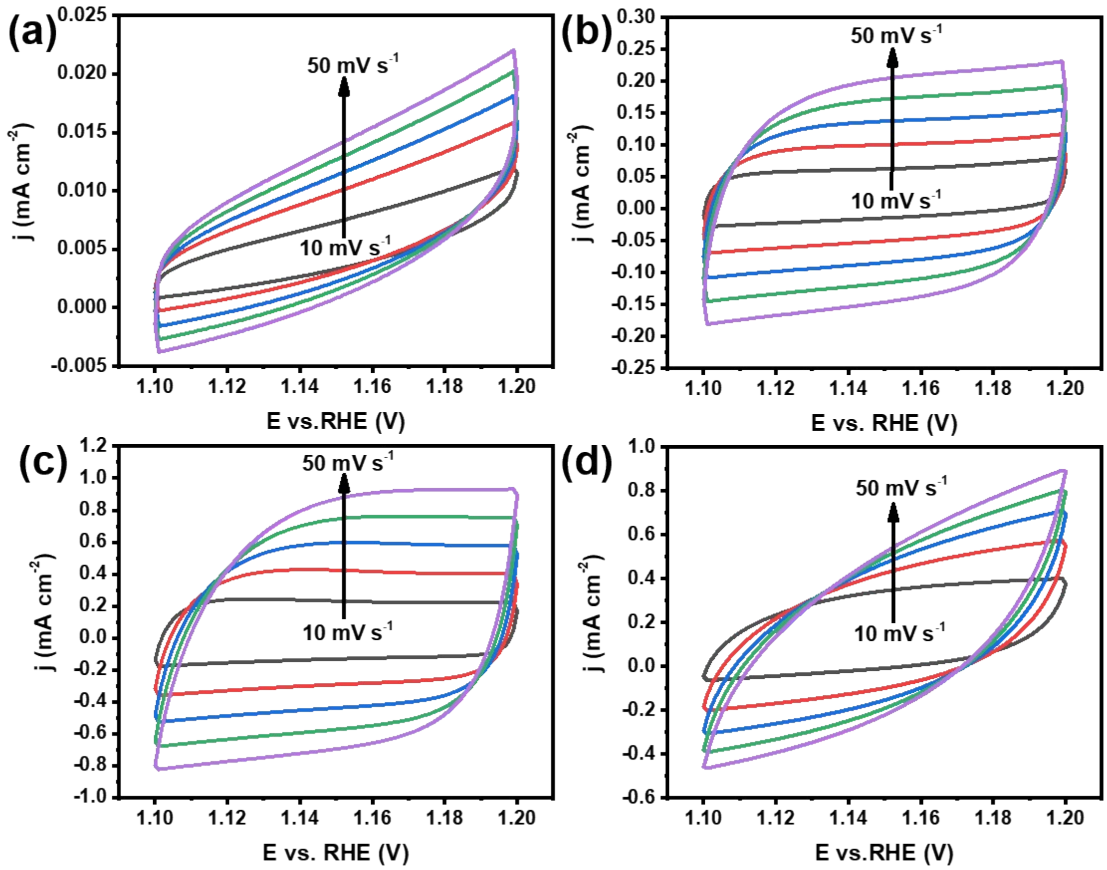

Figure S6. CV curves acquired at the different scanning rates of 10-50 mV s^{-1} from (a) COF, (b) Co/CoO@COF-0.25, (c) Co/CoO@COF and (d) Co/CoO@COF-0.75.

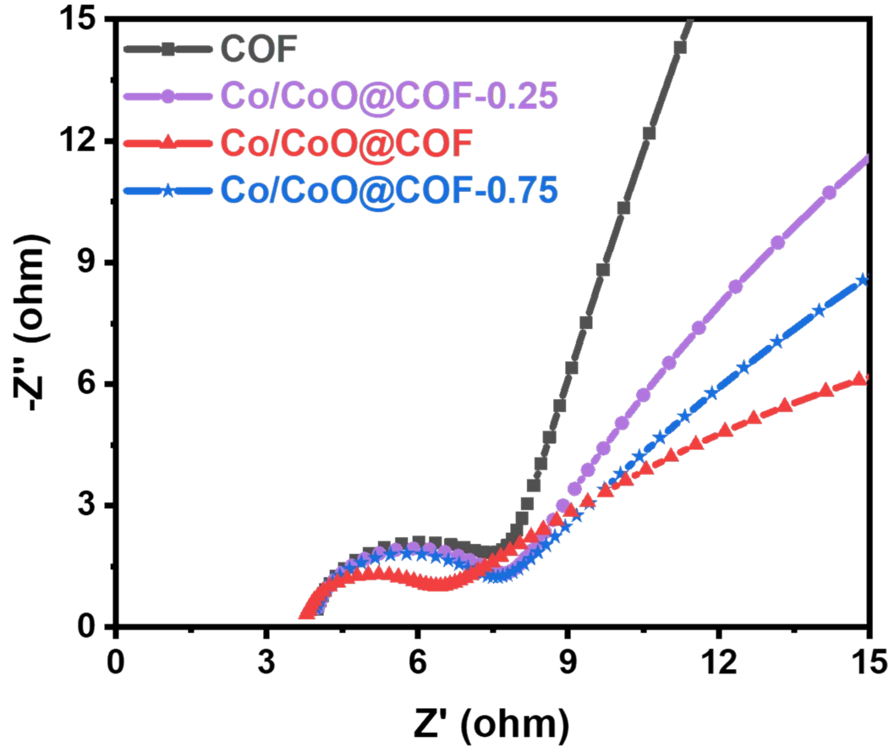

Figure S7. COF, Co/CoO@COF-0.25, Co/CoO@COF and Co/CoO@COF-0.75 amplified Nyquist plot at bias potential of 1.5V vs RHE.

The R_f of Co/CoO@COF is 2.36 Ω, which has a smallest resistance compared to Co/CoO@COF-0.25 (3.79 Ω), Co/CoO@COF-0.75 (3.47 Ω), and COF (4.13 Ω), which is conducive to the transport of charges.

Table S2. Comparison of the long-term durability of the Co/CoO@COF catalyst and related catalysts that have been reported

Catalyst	Cycle of CV	Remark after durability test	Ref.
Co/CoO@COF	**2000**	**Negligible decay**	**This work**
BP-CN-c	1000	Negligible decay	*Adv. Mater.* 2021, **33**, 2008752
BP-CN-p	1000	40 mV decay	
F-Co_3Fe LDH	3000	Negligible decay	*J. Mater. Chem. A*, 2019, **7**, 14483-14488
FeS-NiS/TM	500	Negligible decay	*Chem. Commun.*, 2019, **55**, 7335-7338
$Ni_{0.9}V0_{.1}$-MOF	2000	Negligible decay	*Catal. Sci. Technol.*, 2020, **10**, 4509-4512
Ni-BDC / $Ni(OH)_2$	2500	Negligible decay	*Nanoscale*, 2019, **11**, 3599-3605
NiFe LDH with Ni vacancies	2000	6 mV decay	*Small*, 2018, **14**, 1800136

Table S3. Comparison of the stability of the Co/CoO@COF catalyst and related catalysts that have been reported

Catalyst	Dur (h)	Remark after stability test	Ref.
Co/CoO@COF	**5**	**~87.90% retention at 10 mA cm^{-2}**	**This work**
COF-C_4N	~2	~83.61% at η≈349 mV	*ACS Energy Lett.*, 2019, **4**, 2251-2258.
Pt/NiO/Ni/CNTs	~10	~81.8% retention at 10 mA cm^{-2}	*Nanoscale*, 2020, **12**, 14615-14625
BP-CN-c	~5	~90% retention at η≈350 mV	*Adv. Mater.*, 2021, **33**, 2008752
RuO_2	~5	~58% retention at η≈350 mV	
$Co_{1.8}Ni(OH)_{5.6}$@ $Co_{1.8}NiS_{0.4}(OH)_{4.8}$	~3	reasonable stability at η≈270 mV	*Adv. Mater.*, 2019, **31**, 1805658.
IrO_2 NPs	~1.2	almost the deactivation	*Angew. Chem. Int. Ed.*, 2019, **58**, 12540.
IrO_2/GCN containing 40 wt% IrO_2	~4	35 mV decay at 20 mA cm^{-2}	
N-Ni_3S_2	~2.77	negligible decay at η≈320 mV	*Adv. Mater.*, 2017, **29**, 1701584.

Note: Dur: Duration for stability test.