Supporting Information

Activity Enhancement of Layered Cobalt Hydroxide Nanocones by ~~Interlayer Spacing Tuning~~ and Phosphidation for Electrocatalytic Water Oxidation in Neutral solution

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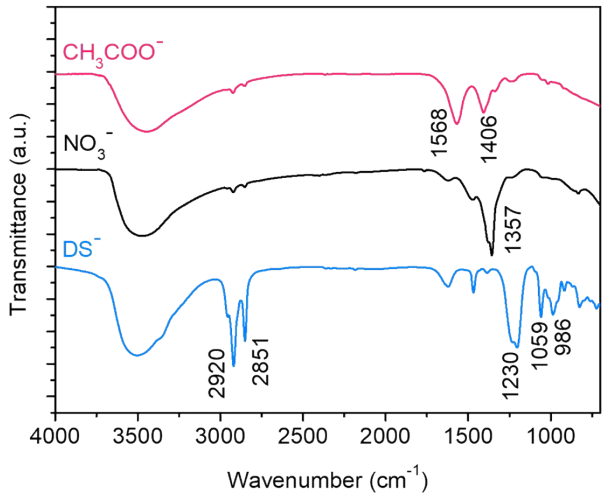

Figure S1. FT-IR spectra of layered cobalt hydroxide NCs intercalated with DS^-, NO_3^- and CH_3COO^- anions, respectively.

Table S1. Activity comparison of electrocatalysts for water oxidation under neutral solution

Electrocatalysts	Preparation method	j (mA cm^{-2})	overpotential (mV)	Tafel slope (mV dec^{-1})	pH/electrolyte	Ref.
3D CoP nanoarray/Ti	oxidative polarization	5	620	293	pH=7, PBS	1
Co_3O_4 quantum dots	drop casting	10	490	80	pH=7, PBS	2
Co-P-B/rGO	drop casting	10	400	68	pH=7, PBS	3
$Co_3(BO_3)_2$@CNT	drop casting	10	487	63	pH=7, KPi	4
Co_2P nanoparticles	electrochemical activation	1	450	129.8	pH=7, PBS	5
CoP nanoarray/carbon cloth	low-temperature phosphidation	10	536	85	pH=7, PBS	6
$NaCo_4(PO_4)_3$ nanoribbons	drop casting	1	373	121	pH=7, PBS	7
Co_3S_4 nanosheets	drop casting	3	620	151	pH=7, PBS	8
CoP NCs	drop casting	5	~~539~~	179	pH=7, PBS	this work
NO_3^--intercalated cobalt hydroxide NCs	drop casting	5	550	178	pH=7, PBS	this work
DS^--intercalated cobalt hydroxide NCs	drop casting	1 5 10	361 500 561	172	pH=7, PBS	this work
CH_3COO^--intercalated cobalt hydroxide NCs	drop casting	5	540	217	pH=7, PBS	this work

530

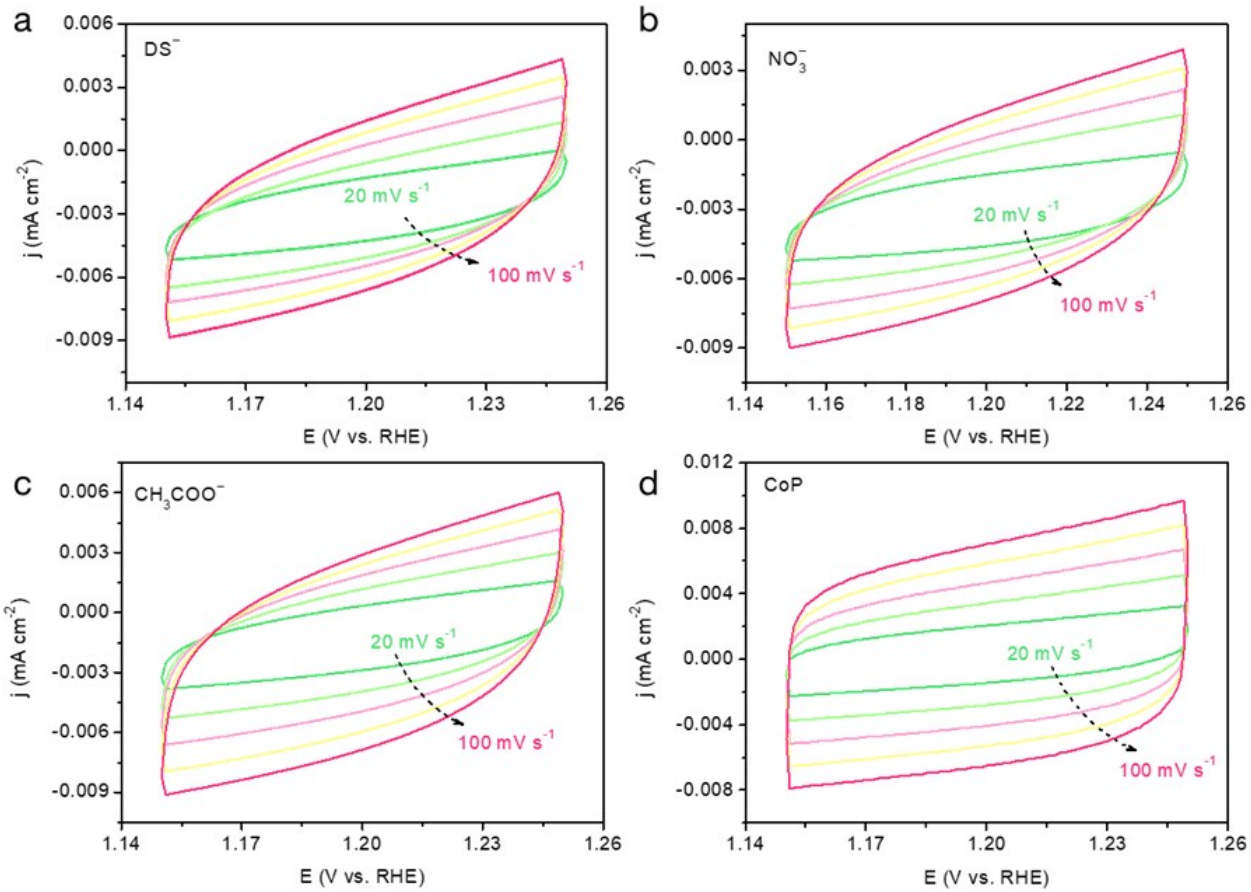

Figure S2. Cyclic voltammetry (CV) curves for (a) DS^{-}-, (b) NO_3^{-}-, (c) CH_3COO^{-}-intercalated cobalt hydroxide NCs and (d) CoP NCs at incremental scan rates in the potential range of 1.15 - 1.25 V vs RHE.

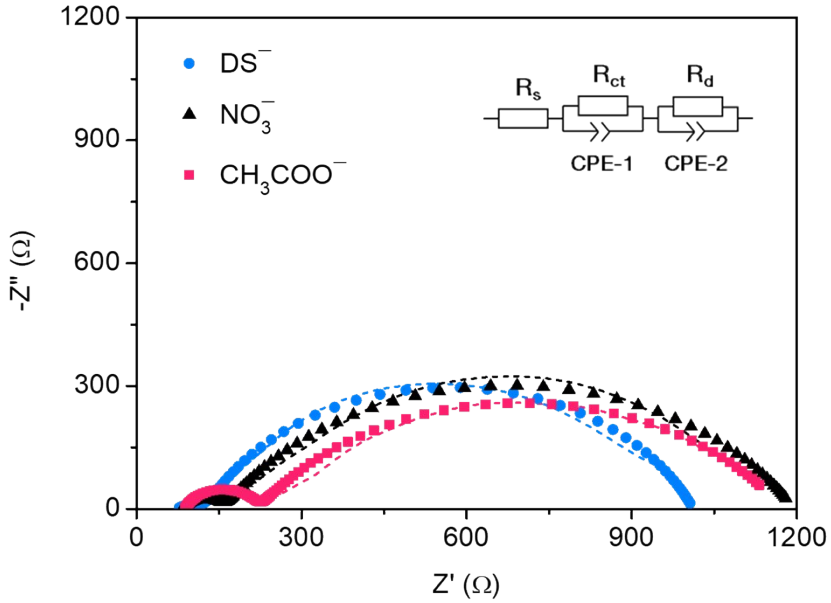

Figure S3. (a) Nyquist plots of DS^{-}-, NO_3^{-}-, CH_3COO^{-}-intercalated cobalt hydroxide NCs. Two semicircles are assigned to the charge-transfer resistance (R_{ct}) and mass-transfer resistance (R_d) in turn. The shot dashes represent the raw data and the symbol dots represent the fitting data. The inset is the equivalent circuit model.

Table S2. The estimated values of R_s, R_{ct} and R_d.

Materials	**R_s (Ω)**	**R_{ct} (Ω)**	**R_d (Ω)**
DS^{-}-intercalated cobalt hydroxide NCs	75.2	57.2	879.7
NO_3^{-}-intercalated cobalt hydroxide NCs	83.3	76.6	1036.0
CH_3COO^{-}-intercalated cobalt hydroxide NCs	88.3	134.8	952.3

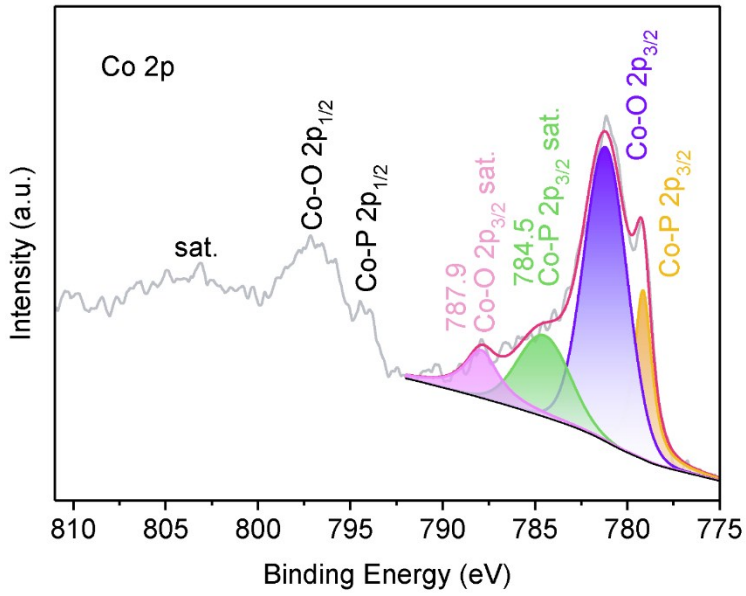

Figure S4. XPS spectrum for post-OER CoP NCs in the Co 2p region.

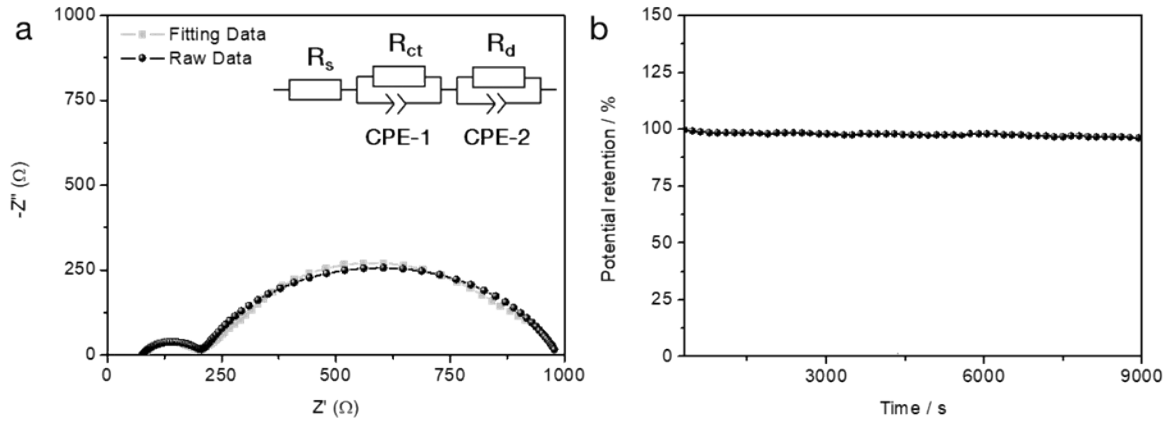

Figure S5. (a) Nyquist plot and (b) chronopotentiometric curve of CoP NCs. Two semicircles are assigned to the charge transfer resistance (R_{ct}) and mass-transport resistance (R_d) in turn. R_s, R_{ct} and R_d were estimated to be 84.0, 132.1 and 778.1 Ω, respectively.

References

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