Electronic Supplementary Material (ESI) for Nanoscale Advances.

Ceria/Cobalt Borate Hybrids as Efficient Electrocatalysts for Water Oxidation in Neutral Conditions

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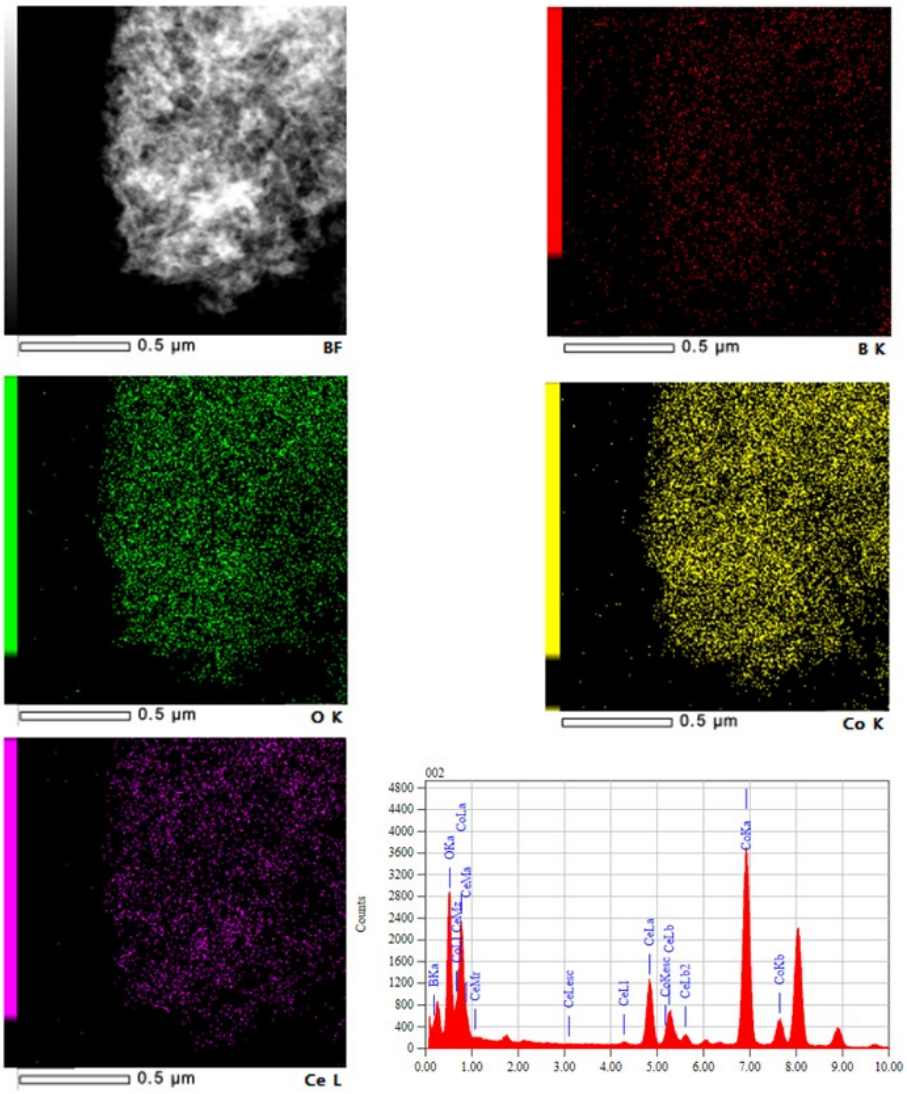

Fig. S1 EDS mapping images for $20CeO_2$/Co-Bi.

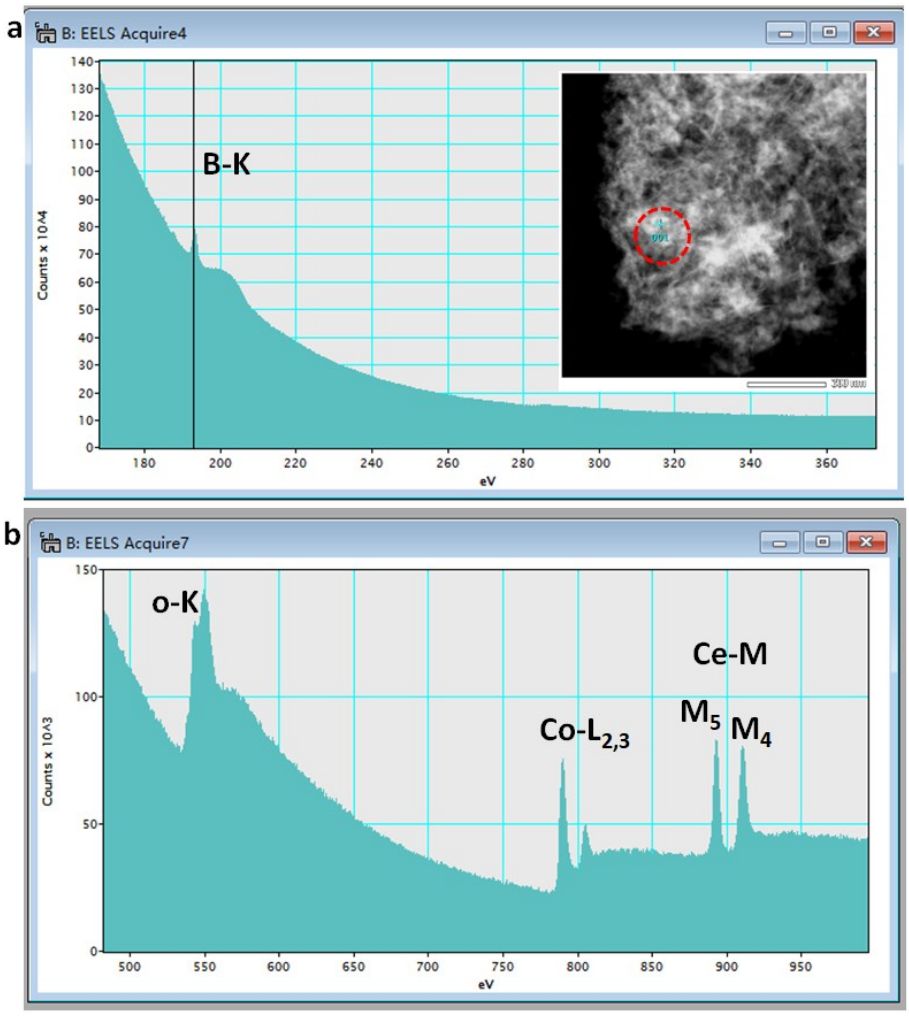

Fig. S2 EELS spectrum of 20CeO_2/Co-Bi measured from the region of inset TEM images.

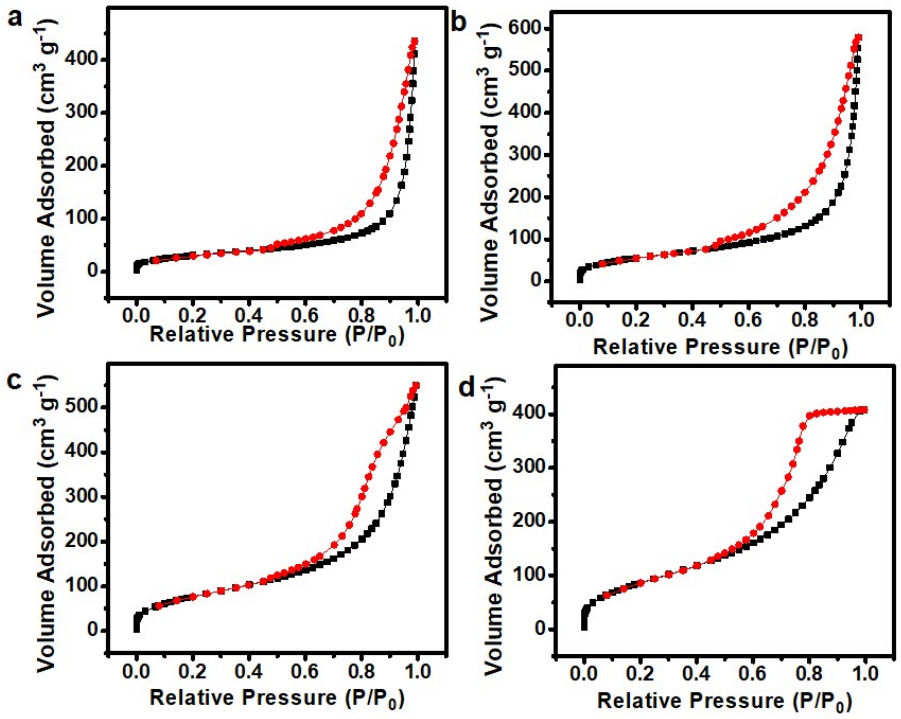

Fig. S3 Nitrogen adsorption/desorption isotherms of the Co-Bi (a),10CeO_2/Co-Bi (b), 20CeO_2/Co-Bi (c) and30CeO_2/Co-Bi (d).

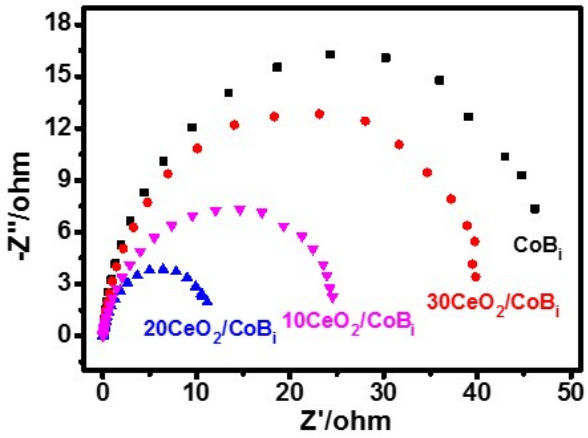

Fig. S4 Impedance Nyquist plots of Co-Bi, 10CeO_2/Co-Bi, 20CeO_2/Co-Bi and 30CeO_2/Co-Bi composites electrodes.

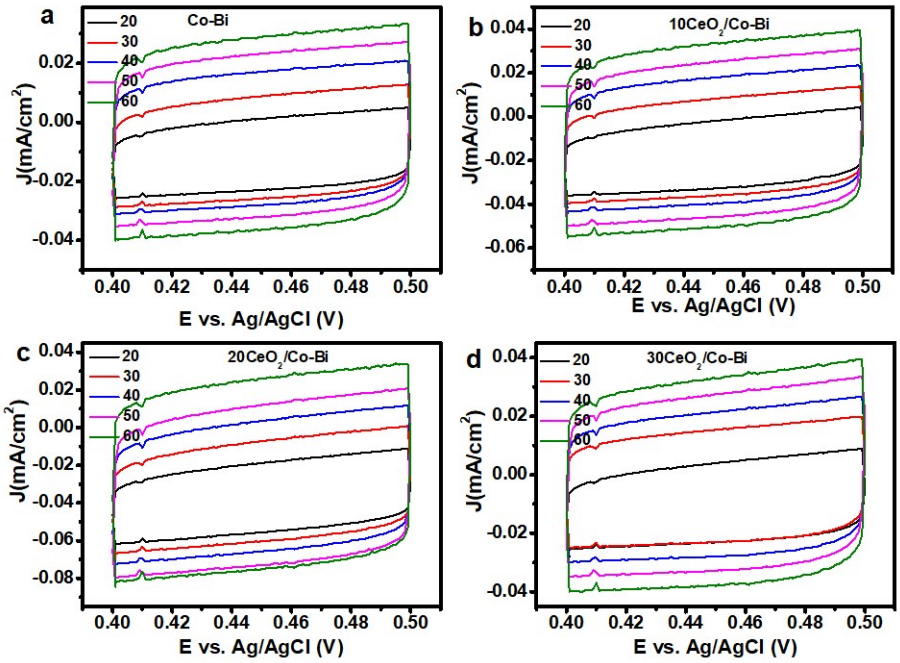

Fig. S5 Cyclic voltammograms for all the samples (Co-Bi, $10CeO_2$/Co-Bi, $20CeO_2$/Co-Bi and $30CeO_2$/Co-Bi composite) in the non-faradaic capacitance current range at scan rates of 10, 20, 30, 40, 50 and 60 mV s^{-1}.

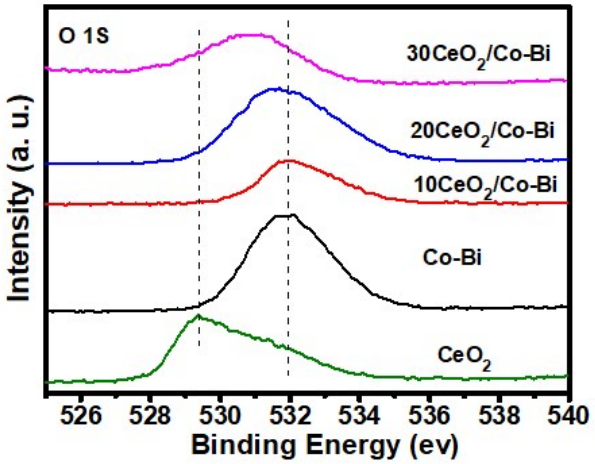

Fig. S6 High-resolution XPS spectra for O of pure CeO_2, Co-Bi, $10CeO_2$/Co-Bi, $20CeO_2$/Co-Bi and $20CeO_2$/Co-Bi hybrid.

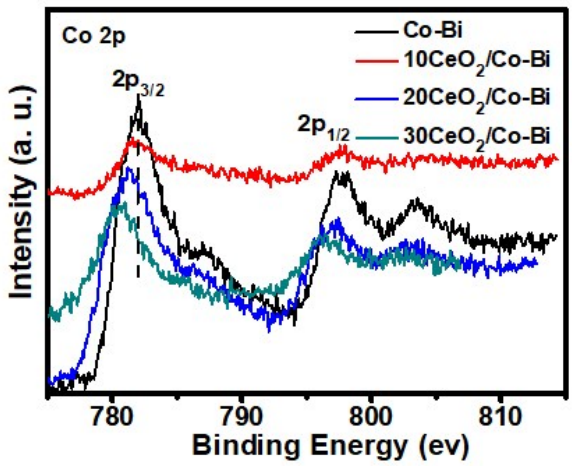

Fig. S7 High-resolution XPS spectra for Co of pure Co-Bi, $10CeO_2$/Co-Bi, $20CeO_2$/Co-Bi and $20CeO_2$/Co-Bi hybrid.

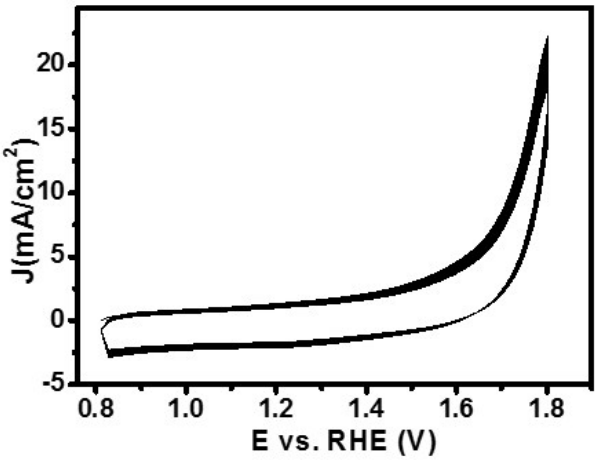

Fig. S8 Cyclic voltammograms for 20CeO_2/Co-Bi composite electrode.

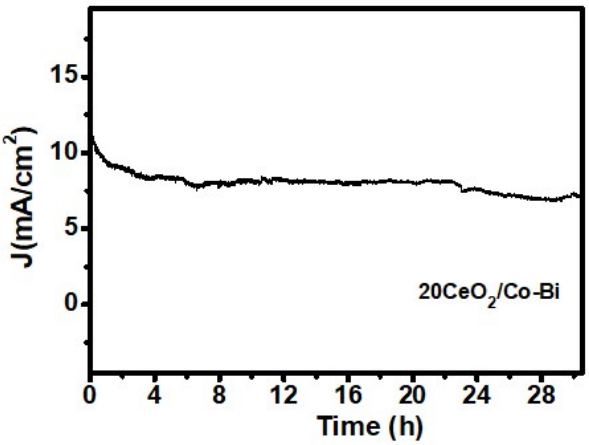

Fig. S9 Chronoamperometric response of of as-prepared 20CeO_2/Co-Bi composite recorded at a constant potential of 1.70V vs. RHE.

Table S1 Comprision of cobalt-based catalysts of OER activities in neutral medium.

sample	Specific current density (mA cm^{-2})	Overpotential (mV)	Electrolyte concentration	Ref
Co-Pi/ITO	1	410	0.1 M KP_i	[1]
Co-Ni LDHs	1	490	$0.1MP_i$+1.73MKNO_3	[2]
Mn_5O_8 Nanoparticles	5	580	0.3 M PBS	[3]
$Co(PO_3)_2$	8	440	0.1 M phosphate	[4]
Co-W	1	420	0.05 M PBS	[5]
Sub-MnO_x	5	530	0.3 M PBS	[6]
Fe-based film	1	480	0.1 M PBS	[7]
Ultrathin Co_3S_4 nanosheets	3	620	0.1 M PBS	[8]
$Mn_3(PO4)_2$	0.32	680	0.5 M PBS	[9]
cobalt hexacyano-ferrate	1	580	$0.05MKP_i$+1M KNO_3	[10]
Au-$Co(OH)_2$	1	410	0.1 M PBS	[11]
$LiMnP_2O_7$	0.5	680	0.5 M PBS	[12]
CoP_i/GO	0.23	780	0.1 M KP_i	[13]
CoP_i Nanoarrays/Ti	10	450	0.1 M PBS	[14]
α-$Co(OH)_2$ NA/CC	10	536	1.0 M PBS	[15]
Fe-Co_3O_4@F-Co-Bi/CC	10	420	0.1 M K-Bi (pH=9.2)	[16]
Co-Bi NA/Ti	10	420	0.1 M K-Bi (pH=9.2)	[17]
NiB_i/CC	10	470	0.1 M KB_i (pH=9.2)	[18]
Co@Co-Bi/Ti	10	470	0.4 M NaBi	[19]
Co-Bi NS/G	10	490	0.1 M PBS	[20]
20CeO_2/CoB_i composite	10	453	0.1 M PBS (pH=7.4)	This work

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