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Supplementary Information

Nanostructured nickel-cobalt alloy with oxide layer for efficient oxygen evolution reaction

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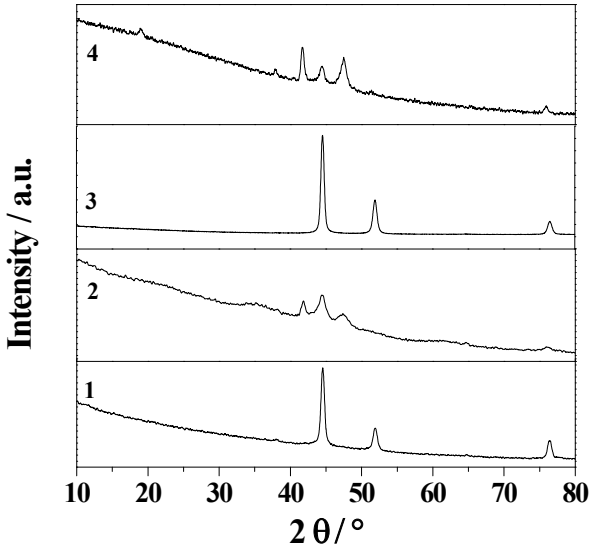

Fig. S1 XRD patterns of pristine NiCo alloy (1), nanostructured (2) NiCo alloy, pristine Ni (3), and pristine Co (4) with oxide layer. Curve 1 and 2 are re-plotted from Fig. 3.

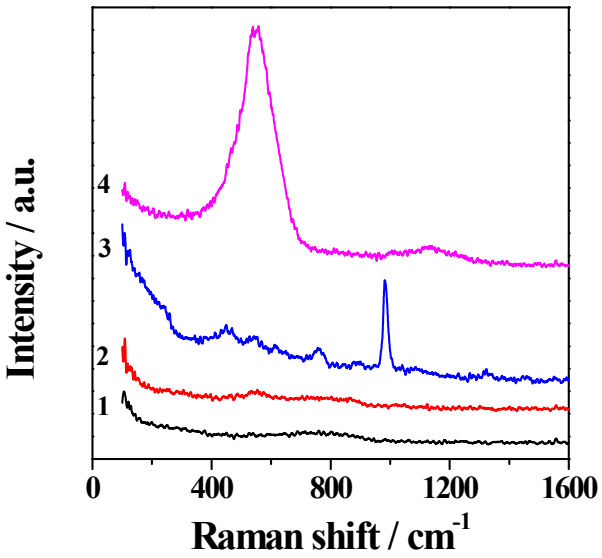

Fig. S2 Raman spectra of pristine NiCo alloy (1) and derived NiCo alloy with oxide layer (2), NiCo-SiO_2 composite film (3) and derived nanostructured alloy with oxide layer (4) .

Table S1. EDX analysis on the points marked in Fig. 4 (composition in at.%).

Position	O K	Si K	Co K	Ni K
1	-	-	29.62	70.38
2	6.11	-	32.69	65.57
3	80.62	10.30	1.90	7.19
4	78.78	0.52	4.64	16.06

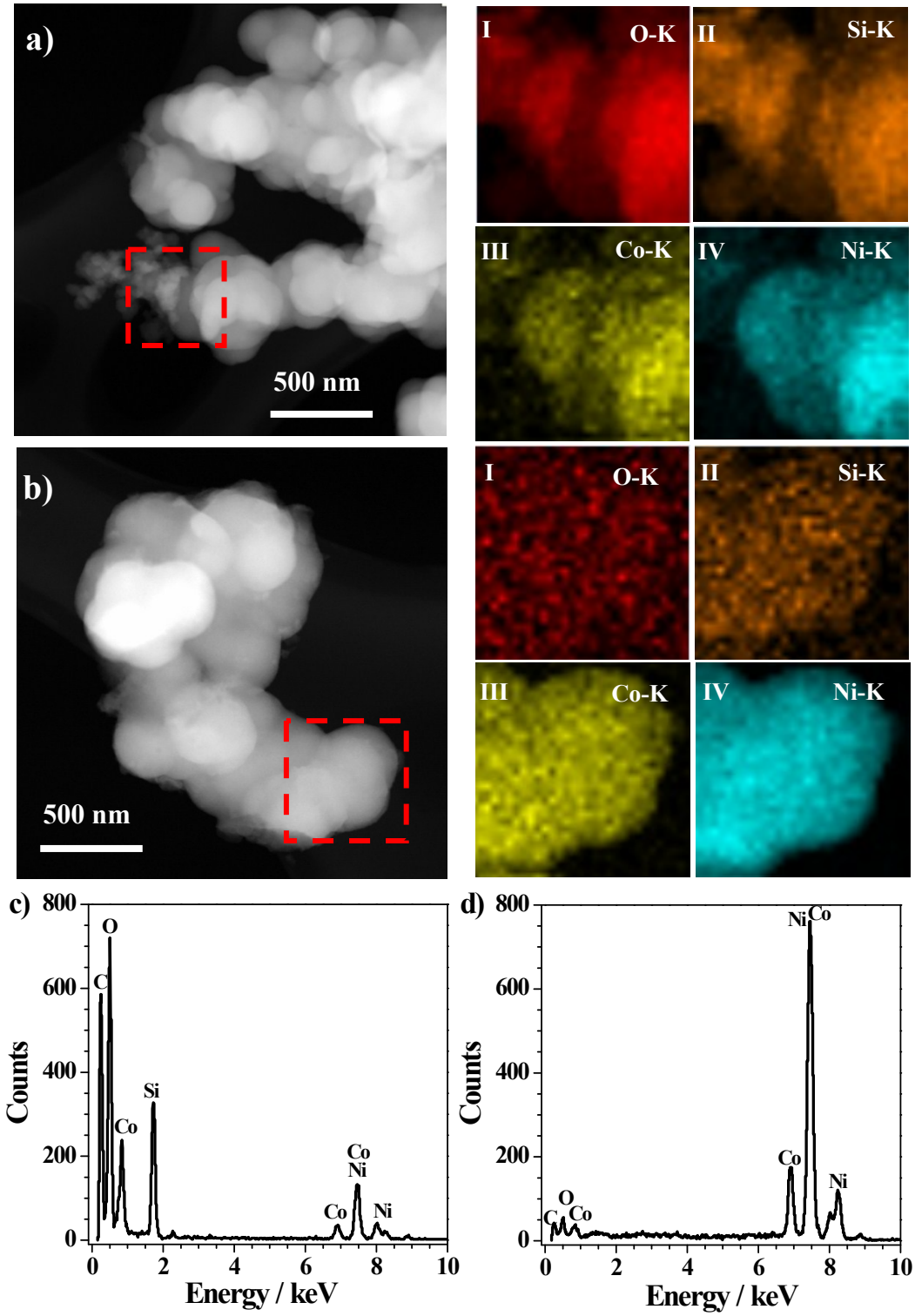

Fig. S3 STEM images of the NiCo-SiO_2 composite film (a) and the derived nanostructured NiCo alloy with oxide layer (b). The corresponding EDX mappings for elements O (I), Si (II), Co (III), and Ni (IV) are also given. EDX patterns of (c) and (d) are derived from the selected areas in (a) and (b), respectively.

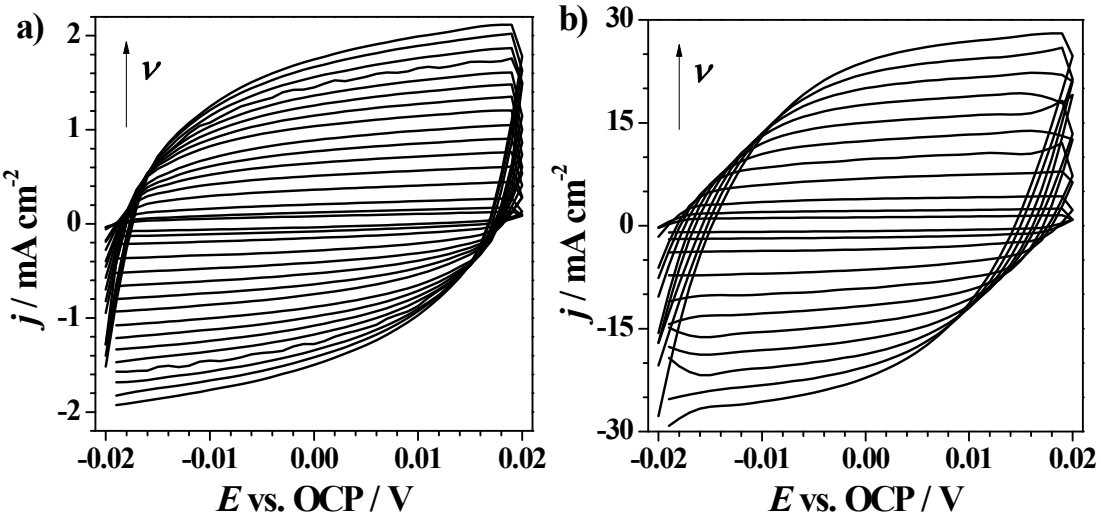

Fig. S4 CV curves in the double layer region at various scan rates from 5 to 280 mV s^{-1} in 1.0 M KOH of the pristine (a) and nanostructured (b) NiCo alloy with oxide layer.

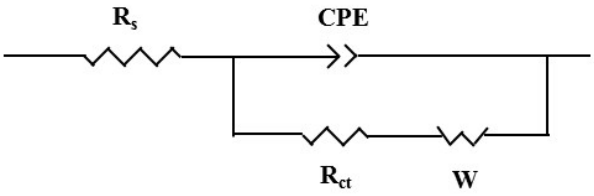

Fig. S5 The equivalent circuit model used for fitting the EIS spectra.

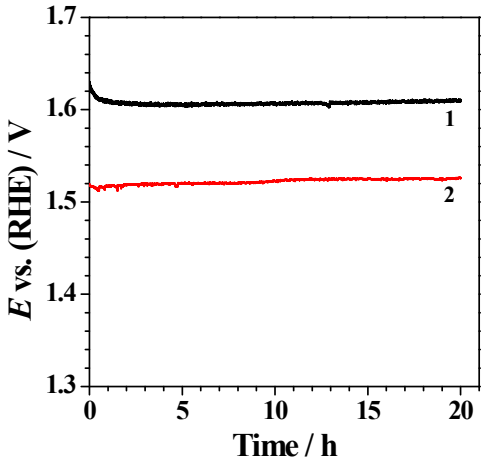

Fig. S6 Chronopotentiometric response of the pristine (1) and nanostructured (2) NiCo alloy with oxide layer at current density of 10 mA cm^{-2} in 1.0 M KOH for 20 h.

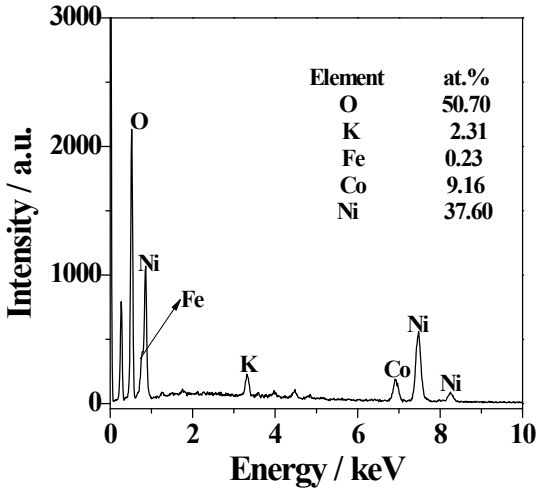

Fig. S7 EDX spectra of the nanostructured NiCo alloy with oxide layer after electrolysis in 1.0 M KOH at 100 mA cm^{-2} for 20 h. Data was collected from powder scratched from the substrate.

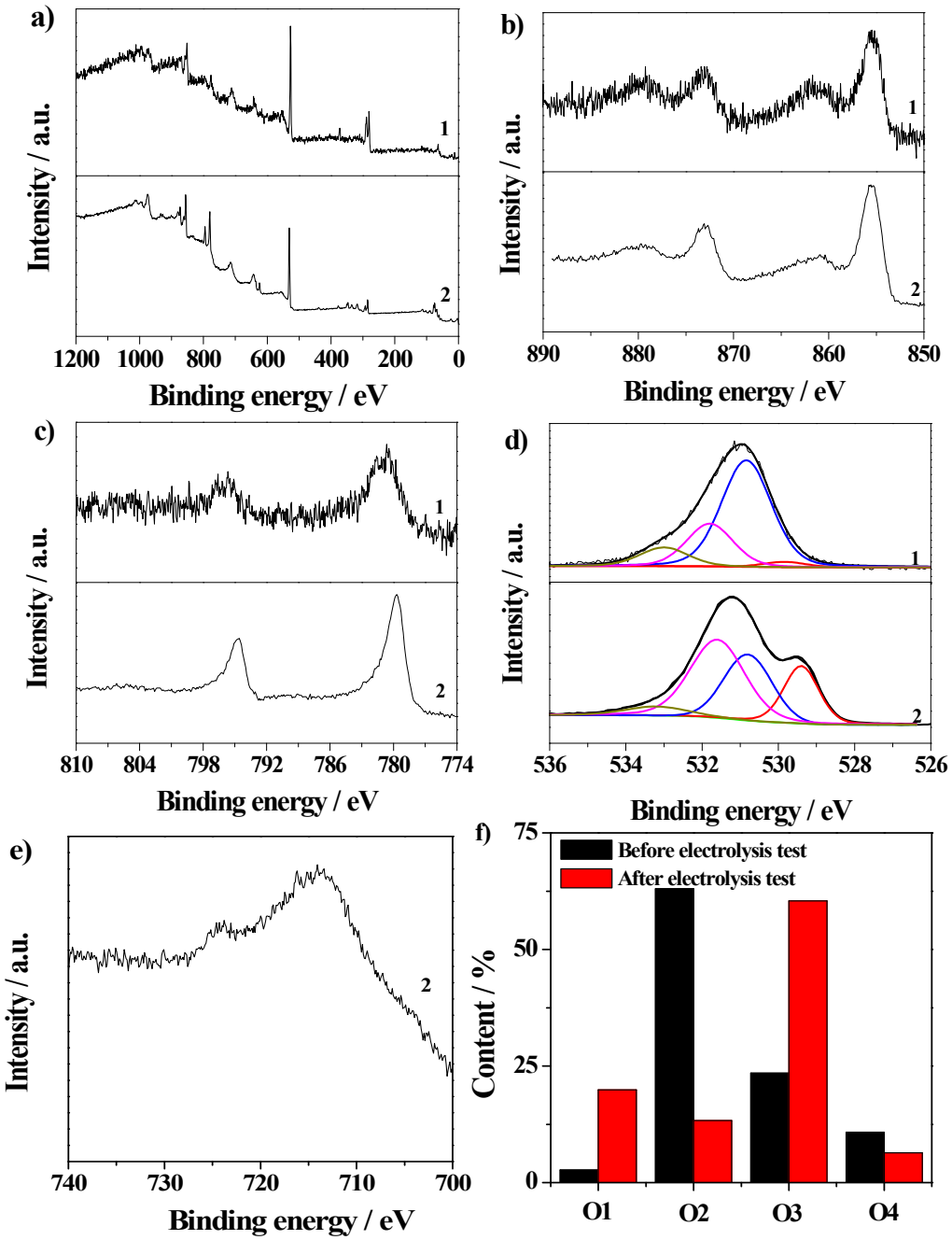

Fig. S8 Survey XPS spectra (a) and high-resolution XPS spectra of Ni 2p (b), Co 2p (c), O 1s (d) and Fe 2p (e) of the nanostructured NiCo alloy with oxide layer before (1) and after (2) electrolysis in 1.0 M KOH at 100 mA cm^{-2} for 20 h. (f) Relative content of O1, O2, O3, and O4 in O 1s on the surface of nanostructured NiCo alloy with oxide layer before and after electrolysis test. The spectra before electrolysis test are re-drawn from Fig. 4.