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Supplementary Materials

Electrocatalytic oxidation of benzyl alcohol for simultaneously promoting H_2 evolution by a $Co_{0.83}Ni_{0.17}$/activated carbon electrocatalyst

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Table S1 The element composition analysis of $Co_{0.83}Ni_{0.17}$/AC obtained from ICP measurements.

	Co (ppm)	Ni (ppm)	Atomic ratio (Co/Ni)
Sample **1**	3.245	0.6612	0.8301/0.1699
Sample **2**	2.022	0.4119	0.8302/0.1698
Sample **3**	1.087	0.2188	0.8307/0.1693

Table S2 The Co and Ni composition analysis of $Co_{0.83}Ni_{0.17}$/AC before and after electrocatalytic oxidation of benzyl alcohol obtained by XPS.

Sample	Ni^0	Ni^{2+}	Ni^{3+}	Co^0	Co^{2+}
before	30.3%	69.6%	0	53.6%	46.4%
after benzyl alcohol oxidation	0	44.8%	55.2%	49.2%	50.8%

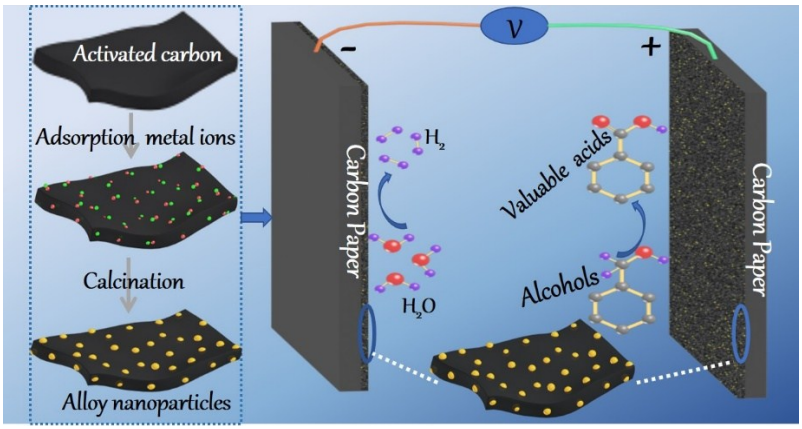

Fig. S1 Schematic illustration of the fabrication processes of $Co_{0.83}Ni_{0.17}$/ACand its application as electrocatalyst in coupling benzyl alcohol oxidation with H_2 evolution from water splitting

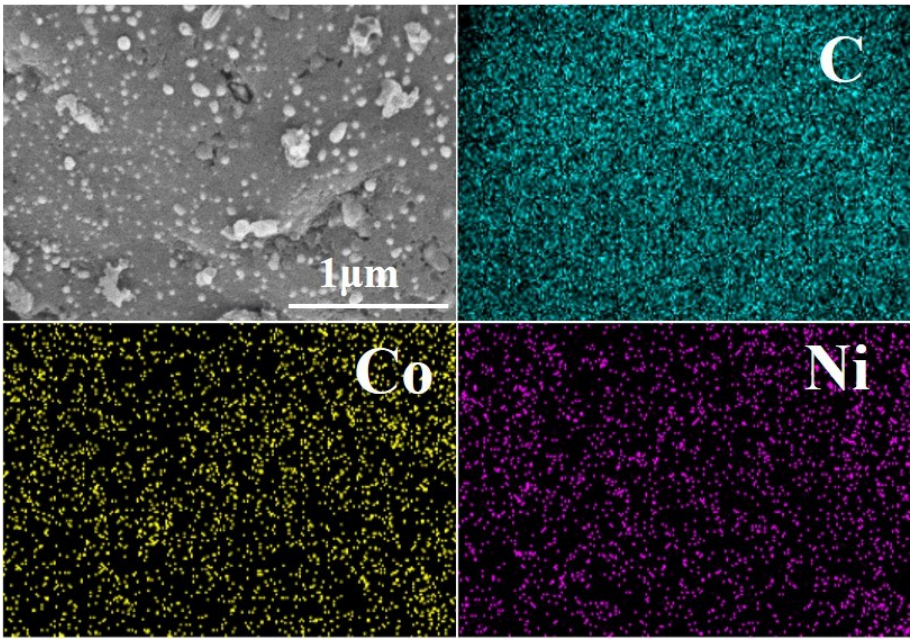

Fig. S2 The elemental mapping images of $Co_{0.83}Ni_{0.17}$/AC.

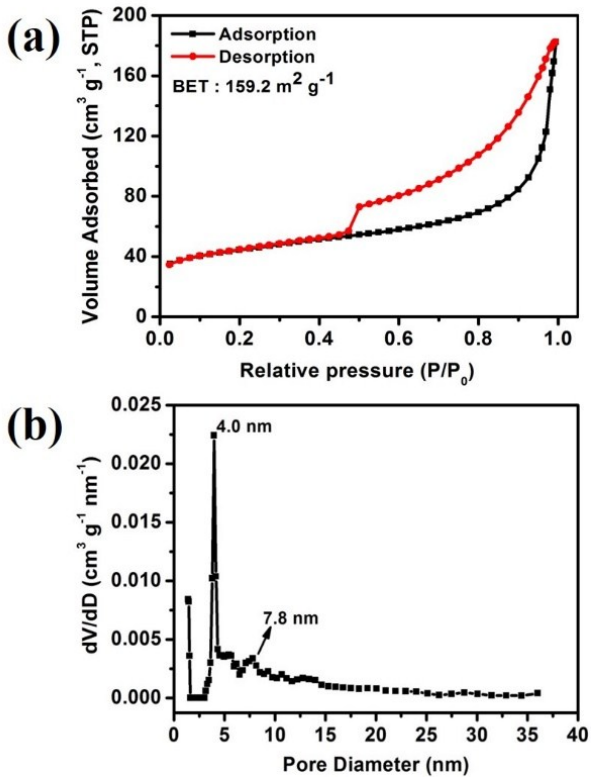

Fig. S3 (a) N_2 adsorption-desorption isotherms and (b) pore size distribution curve of $Co_{0.83}Ni_{0.17}$/AC.

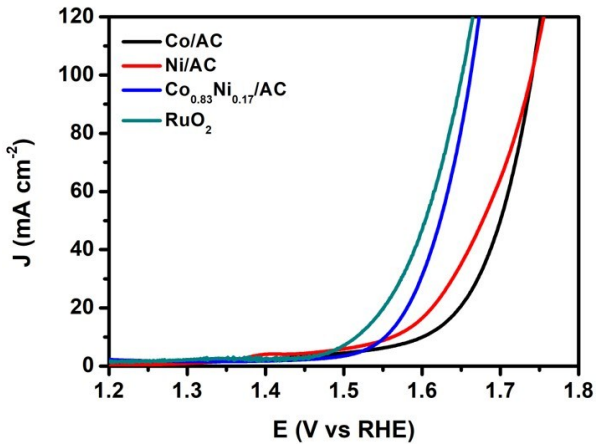

Fig. S4 LSV curves with *i*R drop compensation of Co/AC, Ni/AC, $Co_{0.83}Ni_{0.17}$/AC and RuO_2 coated carbon paper electrode in 1.0 M KOH with a scan rate of 5 mV s^{-1}.

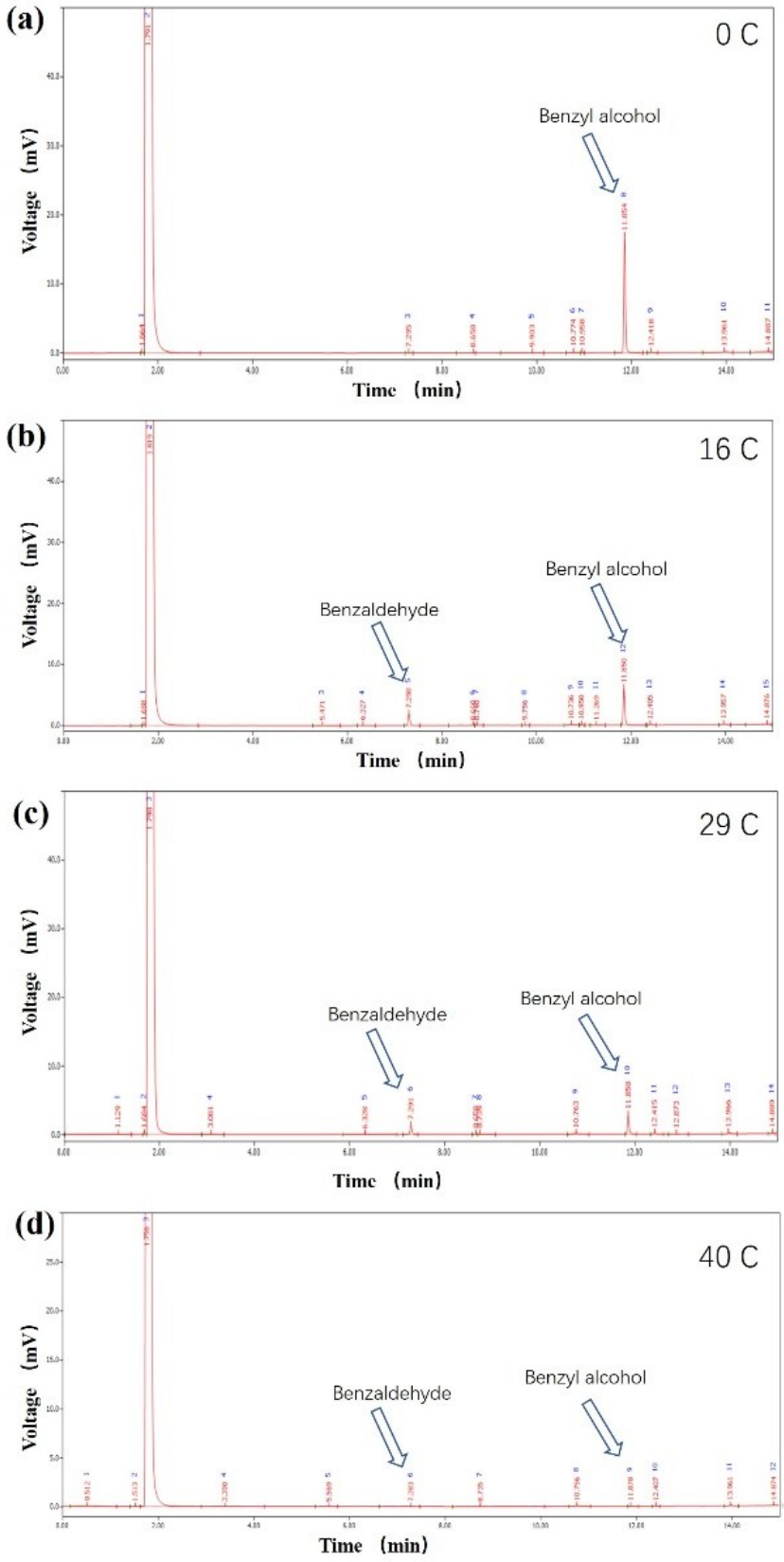

Fig. S5 Gas chromatogram analysis of benzyl alcohol oxidation by $Co_{0.83}Ni_{0.17}$/AC at 1.425 V (*vs.* RHE) over the passed charge.

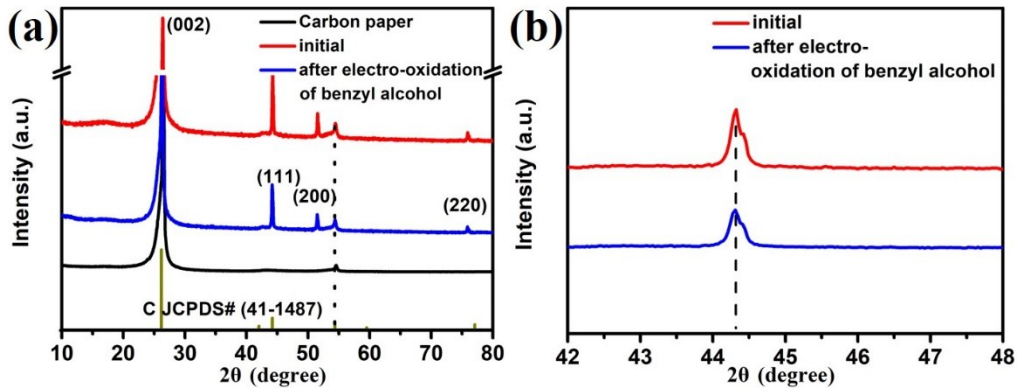

Fig. S6 XRD patterns of before and after electrocatalytic oxidation of benzyl alcohol by $Co_{0.83}Ni_{0.17}$/AC.

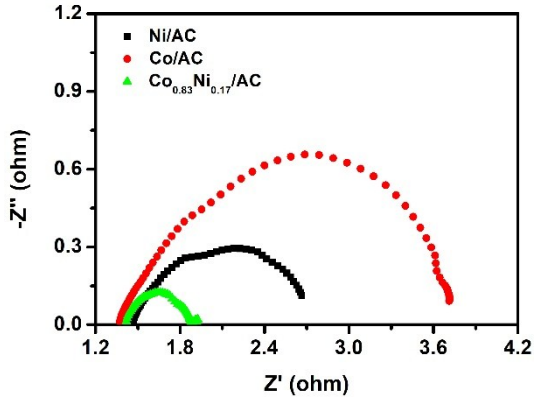

Fig. S7 EIS spectra of Co/AC, Ni/AC and $Co_{0.83}Ni_{0.17}$/AC in 1.0 M KOH solution with 10 mM benzyl alcohol.

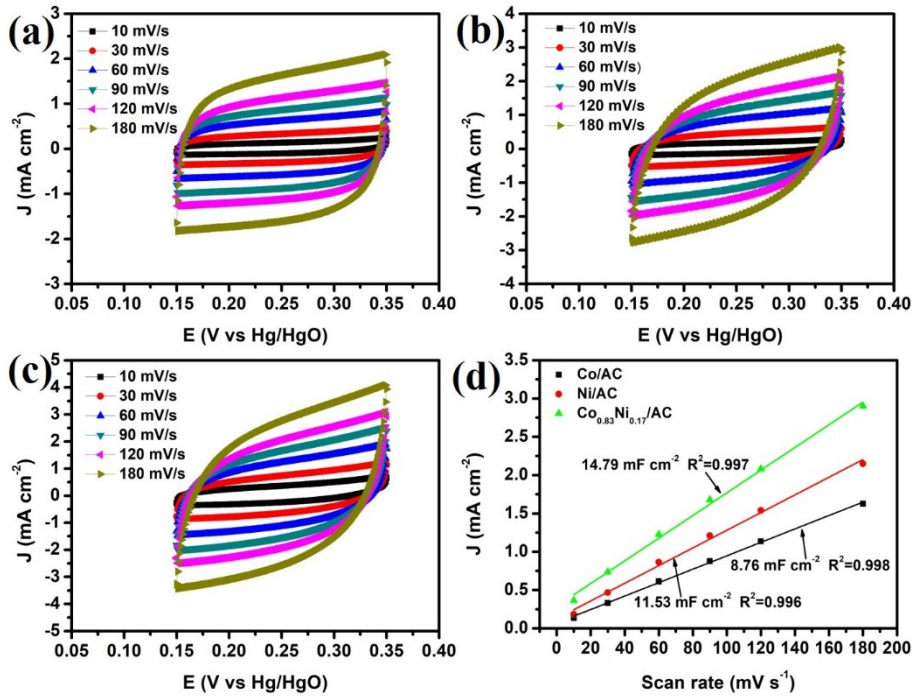

Fig. S8 Cyclic voltammogram measurements of (a) Co/AC, (b) Ni/AC and (c) $Co_{0.83}Ni_{0.17}$/AC with different scanning rates in 1.0 M KOH. (d) The corresponding measured capacitive currents plotted as a function of scanning rate.