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Supplementary Information

Asymmetric metal oxide pseudocapacitors advanced by three-dimensional nanoporous metal electrodes

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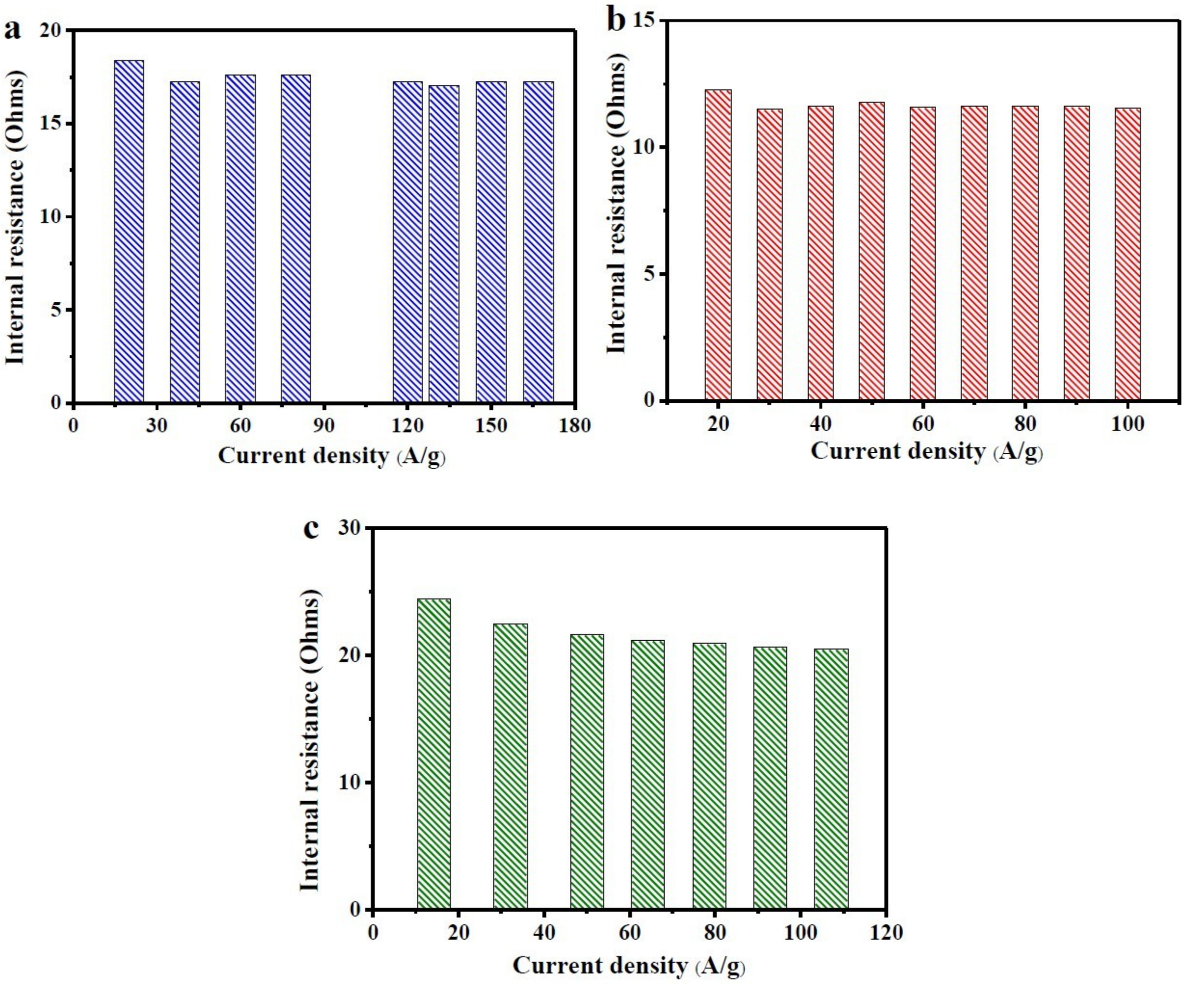

Fig. S1 Internal resistances of (a) the RuO_2-NPG electrode; (b) the $Co(OH)_2$-NPG electrode; and (c) RuO_2-NPG//$Co(OH)_2$-NPG supercapacitor in 1 M NaOH electrolyte.

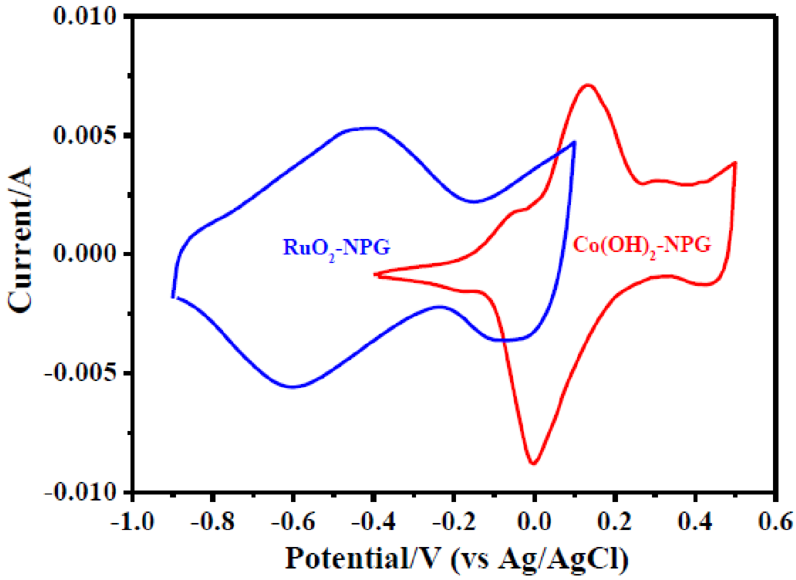

Fig. S2 Combined CV curves of the RuO_2-NPG and $Co(OH)_2$-NPG electrodes in the three-electrode system.

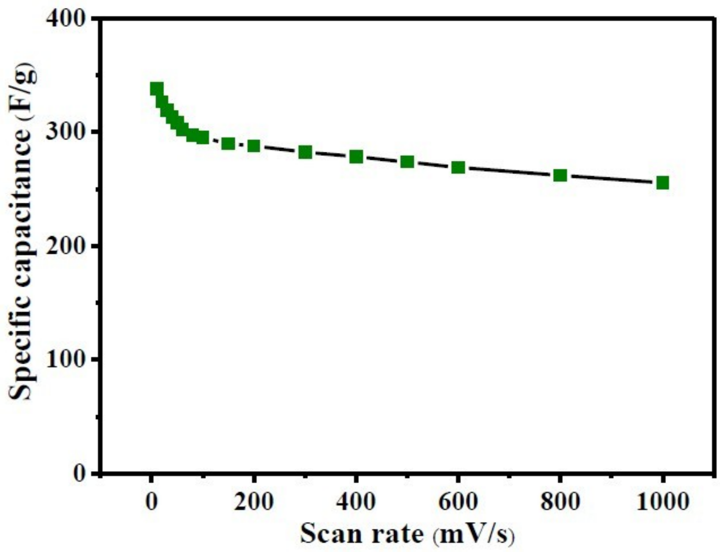

Fig. S3 Specific capacitance of the RuO_2-NPG//$Co(OH)_2$-NPG supercapacitor at different scan rates in 1 M NaOH electrolyte.

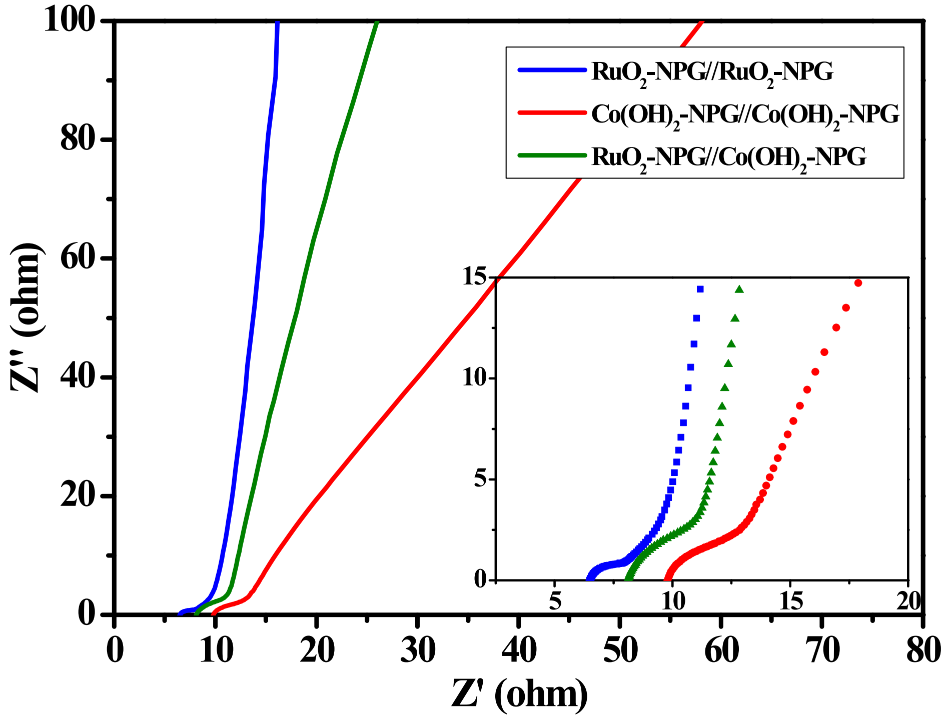

Fig. S4 EIS spectra of the RuO_2-NPG//$Co(OH)_2$-NPG supercapacitor and relevant symmetric supercapacitors in 1 M NaOH electrolyte.

Table S1. Comparison of specific capacitance, energy density, and power density for different asymmetric supercapacitors.

Electrodes	Specific capacitance (F/g)	Energy density (Wh/kg)	Power density (kW/kg)	Ref.
RuO_2-NPG//$Co(OH)_2$-NPG	350	120	70	This work
Transition-metal-oxide nanowire//SWCNT	184	25.5	50.3	[1]
MnO_2 nanowire//Graphene	31	30.4	5	[2]
RGO–RuO_2//RGO–PANi	----	26.3	49.8	[3]
$Ni(OH)_2$//CNT	112	50.6	2	[4]
Graphene MnO_2//Graphene	---	10.03	2.53	[5]

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[3] Zhang, J. T.; Jiang, J. W.; Li, H. L.; Zhao, X. S. *Energy Environ. Sci.* 2011, **4**, 4009.

[4] Tang, Z.; Tang, C. H.; Gong, H. *Adv. Funct. Mater*. 2012, **22**, 1272.

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Equation S1. Calculating the theoretical specific capacitance of asymmetric supercapacitor from the experimental specific capacitance of electrode material measured by three-electrode method.

$$\frac{1}{C_{sc}} = \frac{1}{C_+} + \frac{1}{C_-}$$

$$C_{sc}^{s} = \frac{C_{sc}}{M_+ + M_-} \qquad \text{(S1)}$$

C_{sc} : Capacitance of supercapacitor (measured by 2-electrode method)

C_+ : Capacitance of positive electrode (measured by 3-electrode method)

C_- : Capacitance of negative electrode (measured by 3-electrode method)

C_{sc}^{s} : Specific capacitance of supercapacitor (normalized by weight $M_+ + M_-$)

C_+^{s} : Specific capacitance of positive electrode (normalized by weight M_+)

C_-^{s} : Specific capacitance of negative electrode (normalized by weight M_-)

From the Equation S1, the theoretical specific capacitance of asymmetric supercapacitor can be calculated about ~375 F/g, which is close to the experimental value (350 F/g) and evidently lower than the specific capacitance of the electrode material.