Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Preparation of Ru-doped TiO_2 nanotube arrays through anodizing TiRu alloys for bifunctional HER/OER electrocatalysts

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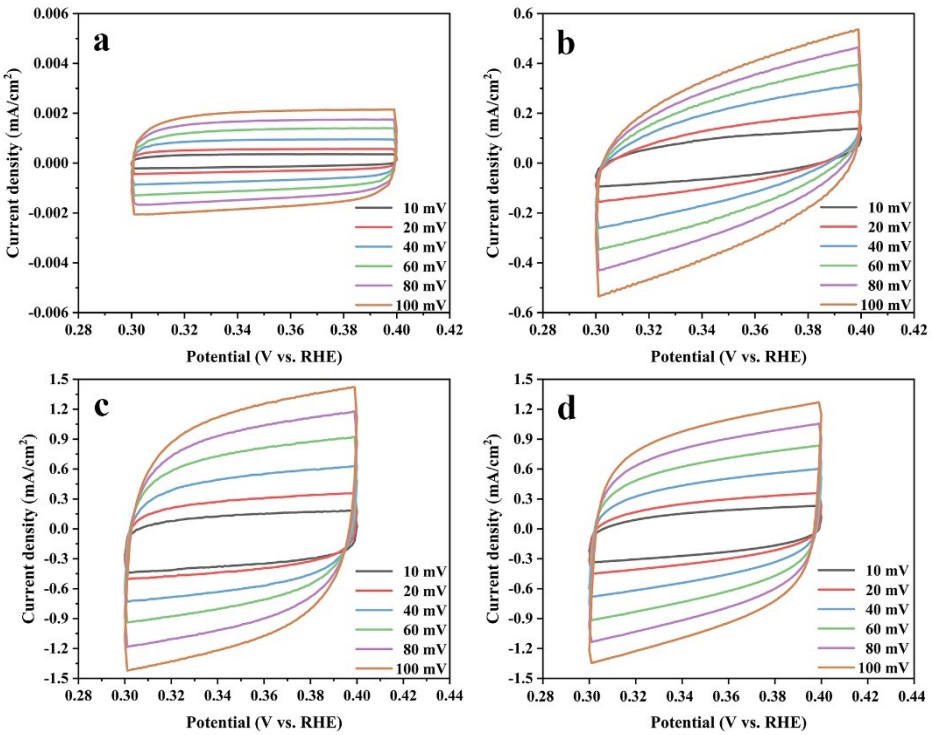

Fig. S1 CV Curves of TNTA and xRu-TNTA at different sweep speeds (a-d)

Table S1 Comparison of the HER performance for a-Ru-TNTA with other reported electrodes

Electrode	Electrolyte	η_{10} (mV)	Tafel slope (mV/dec)	C_{dl} (mF/cm^2)	Ref.
a-Ru-TNTA(RT)	1 M KOH	41	67	7.7	This
a-Ru-TNTA(80 °C)	1 M KOH	19	64	-	work
TiO_2@Co_9S_8/NF	1 M KOH	139	65	-	1
H-TiO_2/CFP-GC	1 M KOH	128	79	-	2
Ru/C-TiO_2/RDE	1 M KOH	44	73.7	-	3
Ni/TiO_2 NPAs/CC	1 M KOH	88	78	8	4
MoS_2/TiO_2-NTs/GCE	1 M KOH	127	59	6.9	5
Ni/TiO_2	1 M KOH	46	41.8	31.1	6
Co-TiO_2@Ti(H_2)	1 M KOH	78	67.8	4.1	7
Ru@RuO_2/GCE	0.1 M KOH	137	112	-	8
NP-RuO_2-450/Ti	1 M KOH	87	45.8	5.18	9
Ru-CoNi@NC	1 M KOH	268	63	-	10
CF@Ru-CoCH NWs	1 M KOH	66	65	29.2	11
Co/Mo_2C/CC	1 M KOH	157	109.2	-	12
P-Co_3Mo_3C/Co/CNFs	1 M KOH	81	64	-	13
VN-Co-P/CC	1 M KOH	137	81	-	14
Cu/CuO@Co/Co_3O_4	1 M KOH	82	48	-	15
CeO_2/Ni-Cu	1 M KOH	72	105.4	36	16
Ni-Cu	1 M KOH	76	46	-	17
Ni–Se–Cu/NF	1 M KOH	136	117.5	2.58	18
Ni-Cu-P@Ni-Cu/NF	1 M KOH	70	76	-	19
Co-P/Co-N-C/NPC/NF	1 M KOH	234	139	-	20
Co/Co_3O_4/NF	1 M KOH	90	44	-	21
Co_3O_4-NiO/SS	1 M KOH	378	90	-	22
NiCoP/SCW	1 M KOH	178	64.4	-	23
Fe-Co_3O_4/CNTs/GCE	1 M KOH	120	54	-	24
FePx@Fe	1 M KOH	124	78	-	25
Ni-Mo-Fe/Cu	1 M KOH	65	63	-	26

Table S2 Comparison of the OER performance for c-Ru-TNTA with other reported electrodes

Electrode	Electrolyte	η_{10} (mV)	Tafel slope (mV/dec)	Ref.
c-Ru-TNTA(RT)	1 M KOH	349	89	This
c-Ru-TNTA(80 °C)	1 M KOH	227	82	work
CoO_x-black TNTA	1 M KOH	352	65	27
Ag_3PO_4-Bi_2WO_6-TiO_2/NF	1 M KOH	356	64	28
TiO_2/SnS_2/NF	1 M NaOH	570	107	29
Cu-(a-$NiSe_x$/c-$NiSe_2$)/TiO_2 NRs/CC	1 M KOH	339	54.2	30
Co-TiO_2/GCE	1 M KOH	390	65	31
Co-$ZIF_{1.5}$/10CNF_2/GC	0.1 M KOH	390	122	32
MnO_2/CNTs/RDE	0.1 M KOH	421	67	33
$Pt_{70}Ru_{25}Ir_5$/GC	0.5 M H_2SO_4	470	118	34
Ru@RuO_2/GC	0.1 M KOH	320	86	8
CoNG/Ru/GCE	1 M KOH	350	82.3	35
α-MnO_2/GCE	1 M KOH	450	73.1	36
Co_3O_4-MnO_2-CNT/GCE	0.1 M KOH	420	68	37
Co-P/Co-N-C/NPC/NF	1 M KOH	374	92	20
H-TiO_2/MnO_x NWs/CC	0.1 M KOH	388	-	38
NS-MnO_2/NF	1 M KOH	320	40	39
CoNCNTF/CNFs/RDE	0.1 M KOH	380	66.8	40
CoNi/BCF/RDE	0.1 M KOH	370	166	41
NiO/$NiCo_2O_4$/GC	1 M KOH	357	130	42
Amorphous cobalt phyllosilicate/CP	1 M KOH	364	60	43

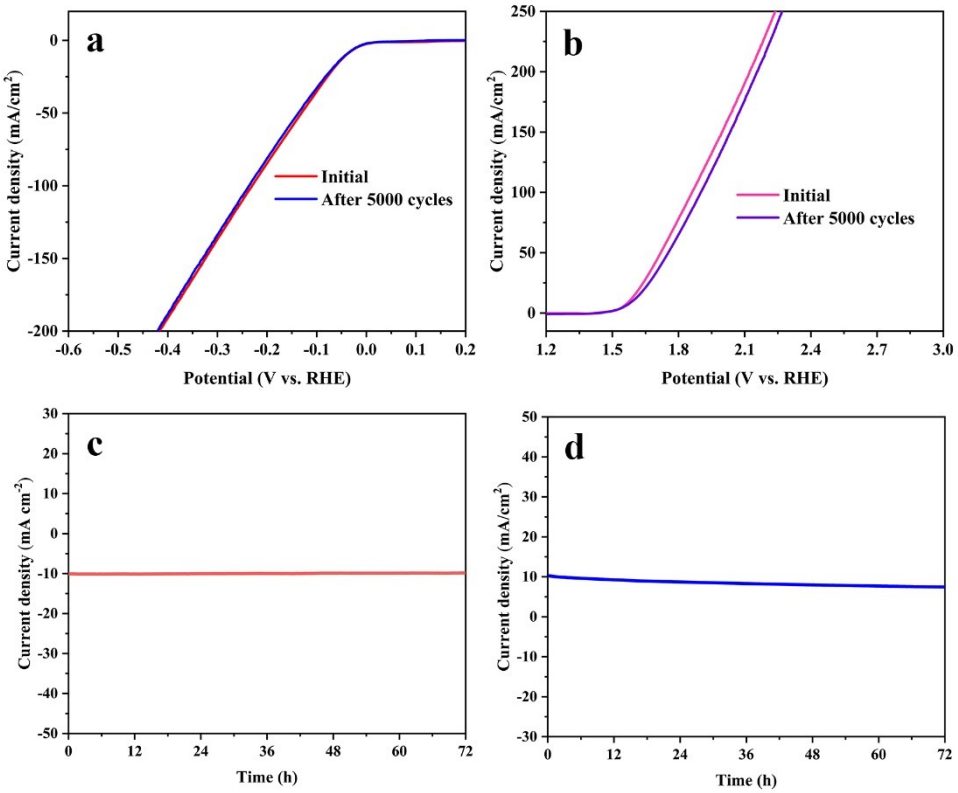

Fig. S2 Polarization curves (a, b) after 5000 CV cycles and current density *vs.* electrolysis time curves (c, d) of a-Ru-TNTA and c-Ru-TNTA

Table S3 Comparison of the overall water voltage (V, 10 mA/cm^2) for different electrode groups with other recently reported

Two-electrode electrolyzer	Electrolyte	Cell voltage	Ref.
a-Ru-TNTA||c-Ru-TNTA	1 M KOH	1.496	This work
Ni(Cu)@NiFeP/NM||Ni(Cu)@NiFeP/NM	1 M KOH	1.601	44
CoP/TiM||CoP/TiM	1 M KOH	1.65	45
Ni-Zn/rGO/NF||Ni-Zn/rGo/NF	1 M KOH	1.687	46
$Co_{0.8}Ru_{0.2}O_x$@NC/CP||$Co_{0.8}Ru_{0.2}O_x$@NC/CP	1 M KOH	1.55	47
Co/Mo_2C/CC||Co/Mo_2C/CC	1 M KOH	1.68	12
CuCl/CuO(Mn)-NF||CuCl/CuO(Mn)-NF	1 M KOH	1.66	48
FePx@Fe||FePx@Fe	1 M KOH	1.67	25
Mn-Ni_2P-0.053||Mn-Ni_2P-0.053	1 M KOH	1.58	49
NiCoP/SCW||NiCoP/SCW	1 M KOH	1.59	23

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