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Supporting Information

Micro/nanostructured $TiNb_2O_7$-related Electrode Materials for High-Performance Electrochemical Energy Storage: Recent Advances and Future Perspectives

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Table S1. Preparations and electrochemical performance of various micro/nanostructured $TiNb_2O_7$ anodes.

Materials	Preparation method	Electrochemical performance	Initial coulombic efficiency	Potential (V)	Electrolyte	Ref.
$TiNb_2O_7$ particles	Solid-state reaction	281 mAh/g at 0.1 C 250 mAh/g after 20 cycles at 0.1 C	93.0% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	[1]
$TiNb_2O_7$ particles	Solid-state reaction	256 mAh/g at 0.1 C 173 mAh/g after 200 cycles at 0.1 C	80.1% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	[2]
Vacuum-annealed $TiNb_2O_7$ particles	Solid-state reaction	260 mAh/g at 0.5 mA/cm 198 mAh/g after 50 cycles at 2.0 mA/cm^2	98.6% (0.5 mA/cm)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	[3]
High-density $TiNb_2O_7$ particles	Solid-state reaction	610 (530) mAh cm^{-3} at 0.2 (5.0) C 305 mAh cm^{-3} at 10 C	~91.0% (54 mA/g)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:2 vol%)	[4]
Ag-coated $TiNb_2O_7$ particles	Solid-state reaction	275 (165) mAh/g at 1.0 (30) C 253 mAh/g after 100 cycles at 1.0 C	~93% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	[5]
$TiNb_2O_7$ nanoparticles	Sol-gel synthesis	213 (76) mAh/g at 1.0 (10) C 175 mAh/g after 300 cycles at 1.0 C	98.0% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	[6]
Mo-doped $TiNb_2O_7$ particles	Sol–gel synthesis	270 (190) mAh/g at 1.0 (10) C 184 mAh/g at 100 C after charging at 1 C	99.0% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	[7]
Highly crystalline $TiNb_2O_7$ particles	Hydrothermal synthesis	341 (240) mAh/g at 60 (6000) mA/g 271 mAh/g after 100 cycles at 300 mA/g	~97.0% (300 mA/g)	07-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:2 vol%)	[8]
$TiNb_2O_7$/CNTs	Hydrolysis reaction	346 (163) mAh/g at 0.1 (30) C 218 mAh/g after 100 cycles at 10 C	~99.0% (10 C)	0.8-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	[9]
Porous $TiNb_2O_7$ nanospheres	Hydrothermal synthesis	327 (167) mAh/g at 0.1 (50) C 160 mAh/g after 1000 cycles at 5 C	94.0% (0.1 C)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	[10]
Mesoporous $TiNb_2O_7$ microspheres	Hydrothermal synthesis	319 (89) mAh/g at 0.1 (30) C 155 mAh/g after 500 cycles at 10 C	93.5% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	[11]
Porosity-Controlled $TiNb_2O_7$ Microspheres	Hydrothermal synthesis	286 (143) mAh/g at 0.1 (100) C 182 mAh/g after 1000 cycles at 5 C	93.6% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	[12]
Hierarchical $TiNb_2O_7$ microspheres	Hydrothermal synthesis	352 (100) mAh/g at 0.1 (20) C 115 mAh/g after 500 cycles at 10 C	85.7% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	[13]
rGO-wrapped $TiNb_2O_7$ microsphere	Hydrothermal synthesis	254 (117) mAh/g at 0.1 (50) C 120 mAh/g after 500 cycles at 5 C	93.3% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and ethyl methyl carbonate (EMC) (EC:EMC, 1:1 vol%)	[14]
Hollow $TiNb_2O_7$@C	Hydrothermal	316 (159) mAh/g at 0.25 (10) C	99.5% (0.25 C)	0.01-3.0	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and	[15]

Spheres	synthesis	283 mAh/g after 100 cycles at 0.25 C		V	diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	
Carbon-coated $Nb_2O_5/TiNb_2O_7$ porous spheres	Hydrothermal synthesis	311 (186) mAh/g at 0.1 (10) C 245 mAh/g after 100 cycles at 0.1 C	88.1% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and ethyl methyl carbonate (EMC) (EC:EMC, 1:2 vol%)	16
$TiNb_2O_7$ nanofibers	Electrospinning synthesis	327 (167) mAh/g at 0.1 (50) C 327 mAh/g after 1000 cycles at 5 C	99.5% (1 C)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	17
$TiNb_2O_7$ nanofibers	Electrospinning synthesis	271 mAh/g at 150 mA/g 222 mAh/g after 150 cycles at 150 mA/g	99.5% (150 mA/g)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	18
"Nano-Pearl-String" $TiNb_2O_7$ fibers	Electrospinning synthesis	284 (63) mAh/g at 0.1 (20) C 250 mAh/g after 50 cycles at 1 C	84.3% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	19
$TiNb_2O_7$ hollow nanofiber	Electrospinning synthesis	323 mAh/g at 0.4 C 158 mAh/g after 900 cycles at 10 C	84.8% (0.4 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	20
$Ti_{1-x}Nb_xN$-$TiNb_2O_7$ nanofibers	Electrospinning synthesis	254 (184) mAh/g at 1 (100) C 174 mAh/g after 500 cycles at 5 C	93.8% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	21
$MoS_2/TiNb_2O_7$ Hetero-nanostructures	Electrospinning synthesis	844 (611) mAh/g at 0.2 (4) A/g 733 mAh/g after 200 cycles at 1 A/g	78.7% (1 A/g)	0.001-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	22
Hierarchical porous $TiNb_2O_7$ nanotubes	Electrospinning synthesis	294 (180) mAh/g at 0.1 (100) C 220 mAh/g after 700 cycles at 1 C	84.0% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	23
$TiNb_2O_7$@carbon microwires	Electrospinning synthesis	311 (75) mAh/g at 0.1 (6) A/g 195 mAh/g after 100 cycles at 0.5 A/g	89.0% (0.5 A/g)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	24
$TiNb_2O_7$ nanowires	Template directing sol-gel method	232 (168) mAh/g at 0.4 (6.0) A/g 98 mAh/g after 2000 cycles at 5.0 A/g	89.1% (0.4 A/g)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	25
$TiNb_2O_7$ nanorods	Sol-gel method	291 (84) mAh/g at 0.1 (50) C 123 mAh/g after 500 cycles at 10 C	91.1% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), dimethyl carbonate (DMC) and ethyl methyl carbonate (EMC) (EC:DMC:EMC, 1:1:1 vol%)	26
$TiNb_2O_7$ nanorods	Sol-gel method	337 (122) mAh/g at 0.1 (20) C 140 mAh/g after 100 cycles at 10 C	82.8% (0.1 C)	0.8-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	27
Ordered Mesostructured $TiNb_2O_7$	Sol-gel method	289 (116) mAh/g at 0.1 (50) C 97 mAh/g after 2000 cycles at 10 C	86.0% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	28
3D ordered porous $TiNb_2O_7$ nanotubes	Sol-gel method	329 (117) mAh/g at 0.1 (30) C 235 mAh/g after 500 cycles at 5 C	~99.0% (5 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	29
Ordered microporous $TiNb_2O_7$	Sol-gel method	251 (84) mAh/g at 1 (20) C 87 mAh/g after 1000 cycles at 10 C	84.0% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	30

Table S2. Preparation method and electrochemical performance of analogues of $TiNb_2O_7$ as LIBs anode.

Materials	Preparation method	Rate/cycle performances	Initial coulombic efficiency	Potential (V)	Electrolyte	Ref.
Bulk $Ti_2Nb_{10}O_{29}$	Solid-state reaction	293 (168) mAh/g at 0.1 (110) C 144 mAh/g after 800 cycles at 10 C	94.2% (0.1 C)	1.0-2.4 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	31
Bulk $Cr_{0.6}Ti_{0.8}Nb_{10.6}O_{29}$	Solid-state reaction	322 (204) mAh/g at 0.1 (10) C 193 mAh/g after 500 cycles at 10 C	94.7% (0.1 C)	0.8-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	32
$Ti_2Nb_{10}O_{29}$/C composite	Solid-state reaction	295.5 (201) mAh/g at 1 (10) C 214 mAh/g after 100 cycles at 5 C	~99.0% (1 C)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	33
$Ti_2Nb_{10}O_{29}$/Ag Composite	Solid-state reaction	253 (173) mAh/g at 1 (10) C 142 mAh/g after 500 cycles at 10 C	94.9% (0.2 C)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	34
$Ti_2Nb_{10}O_{29}$ hollow nanofibers	Electrospinning synthesis	307 (176) mAh/g at 0.1 (10) C 123 mAh/g after 500 cycles at 10 C	90.8% (0.1 C)	0.8-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	35
Porous $Ti_2Nb_{10}O_{29}$ nanospheres	Solvothermal synthesis	312 (208) mAh/g at 0.1 (20) C 215 mAh/g after 500 cycles at 10 C	~92.0% (0.1 C)	0.8-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	36
$Ti_2Nb_{10}O_{29}$/C microspheres	Solvothermal synthesis	277 (218) mAh/g at 1 (30) C 187 mAh/g after 200 cycles at 10 C	93.1% (10 C)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate, ethyl methyl carbonate and diethyl carbonate (EC:EMC:DEC, 1:1:1 vol%)	37
Graphene/$Ti_2Nb_{10}O_{29}$/Hydrogen molybdenum bronze composite arrays		317 (220) mAh/g at 2 (20) C 174 mAh/g after 1000 cycles at 30C	~100.0% (10 C)	1.0-2.5 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	38
Particulate $TiNb_6O_{17}$	Solid-state reaction	252 (187) mAh/g at 1 (10) C 80 mAh/g at 30 C	~96.0% (0.1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:2 vol%)	39
$TiNb_6O_{17}$/C composite	Solid-state reaction	239 (200) mAh/g at 1 (10) C 165 mAh/g after 500 cycles at 10 C	~92.0% (1 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), dimethyl carbonate (DMC) and ethyl methyl carbonate (EMC) (EC:DMC:EMC, 1:1:1 vol%)	40
mesoporous $TiNb_6O_{17}$ microspheres	Solvothermal synthesis	274 (175) mAh/g at 1 (30) C 160 mAh/g after 500 cycles at 10 C	95.9% (0.2 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate, ethyl methyl carbonate and diethyl carbonate	41

					(EC:EMC:DEC, 1:1:1 vol%)	
Porous $TiNb_{24}O_{62}$ microspheres	Solvothermal synthesis	261 (181) mAh/g at 1 (20) C 183 mAh/g after 500 cycles at 10 C	85.7% (0.1 C)	0.8-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC), diethyl carbonate (DEC) and dimethyl carbonate (DMC) (EC:DEC:DMC, 1:1:1 vol%)	42
nitrogen-doped carbon coated $TiNb_{24}O_{62}$ nanowires	Electrospinning synthesis	210 (177) mAh/g at 1 (6) C 149 mAh/g after 900 cycles at 10 C	~90.0% (0.25 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	43
$Ti_2Nb_2O_9$	Topotactic reactions	144 mAh/g at 0.1 C 125 mAh/g after 30 cycles at 0.1 C		1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and dimethyl carbonate (DMC) (EC:DMC, 1:1 vol%)	44
$H_{0.92}K_{0.08}TiNbO_5$ Nanowires microspheres	Electrospinning, ion-exchange	186 (93) mAh/g at 0.5 (5.0) C 124 mAh/g after 150 cycles at 0.5 C	70.7% (0.5 C)	1.0-3.0 V	1M $LiPF_6$ dissolved in ethylene carbonate (EC) and diethyl carbonate (DEC) (EC:DEC, 1:1 vol%)	45

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