

Supporting Information

Enhancing the electrochemical properties of TiNb_2O_7 anode with SP-CNT binary conductive agents for both liquid and solid state lithium ion batteries

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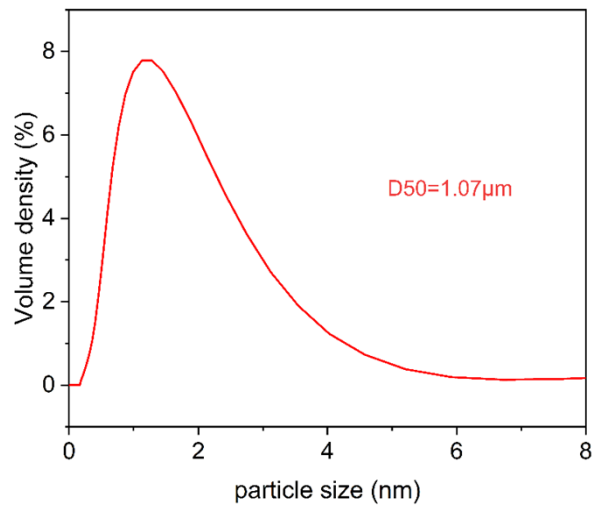


Fig. S1 The laser particle size distribution of the TNO powders.

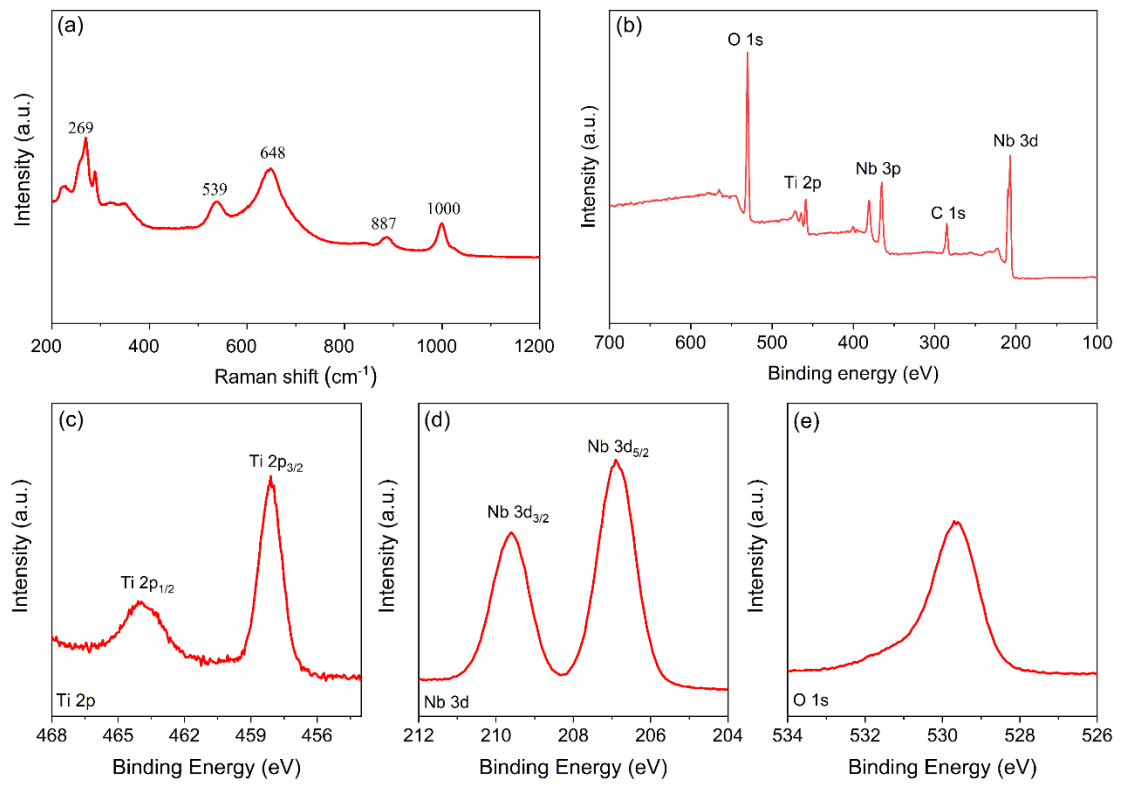


Fig. S2 (a) Raman spectra of the TNO powders. XPS spectra of (b) the wide scan, (c) Ti 2p, (d) Nb 3d and (e) O 1s of TNO powders.

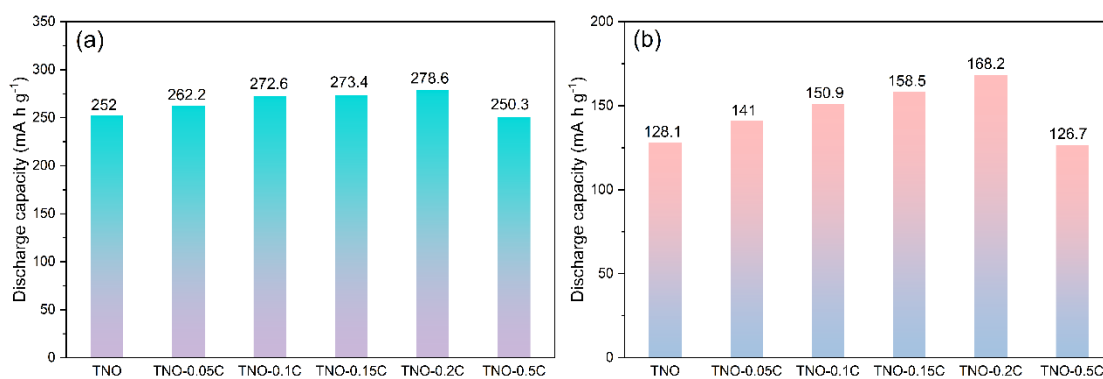


Fig. S3 Discharge capacities of TNO and TNO-C anodes at (a) 0.5C and (b) 10C.

Table S1 Properties comparison among reported TNO anodes and this work.

Materials	Synthesized method	Morphological characteristics	Rate capacity (mA h g ⁻¹)		Cyclic performance (mA h g ⁻¹)	Ref.
			1C	10C		
Sn-TNO	Solid state synthesis	Bulk particle (1μm)	245	146	183.6 (5C, after 200 cycles)	1
TNO/RGO	Solid state synthesis	Bulk particle (500nm)	220	100	173 (1C, after 50 cycles)	2
MS-TNO	Solvothermal method	Nanosheet (500nm)	276	165.8	245.8 (5C, after 1000 cycles)	3
Al-TNO	Solvothermal method	Nanoparticle (200nm)	261	207	154.7 (5C, after 250)	4
TNO/MWCN Ts	Solvothermal method	Nanoparticle (200nm)	260	95	145.6 (1C, after 200)	5
P-TNO	Solvothermal method	Nanosphere (300nm)	238	149.6	141.5 (10C, after 1000)	6
Cu-TNO	Solvothermal method	Nanosphere (1μm)	234	200	214 (1C, after 100 cycles)	7
TNO/NC	Electrospinning method	Nanowires (diameter:300nm)	210	162	148.9 (10 C, after 900 cycles)	8
Cr-TNO	Hydrothermal method	Columnar morphology (50 nm)	255	178.2	187.8 (5C, after 500 cycles)	9
EG-TNO	Solvothermal method	Nanosphere (1μm)	220	80	133.9 (1C, after 200 cycles)	10
TNO-0.2C	Solid state synthesis	Bulk particle (1μm)	256	178.1	222.8 (1.5C, after 200 cycles)	This work

Table S2 Formula Symbol Unit Table

Physical quantity	Abbreviation	Unit
Gas constant	R	$\text{J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$
Absolute temperature	T	K
Surface area of the electrode	A	cm^2
Electron-transfer number	n	-
Faraday constant	F	$\text{A}\cdot\text{s}\cdot\text{mol}^{-1}$
Molar concentration of Li^+	C	$\text{mol}\cdot\text{L}^{-1}$
Angular frequency	ω	s^{-1}
Warburg coefficient	σ	$\Omega\cdot\text{cm}^2\cdot\text{mol}$

Notes and references

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