榮 炭

Long Time Tech. Co., Ltd.

Anode Materials for Li-ion Battery

Product： SiO/C

Product Name： LT-ZH-9X-380

Version： IA

Headquarters http://www.lttech.com.tw

〇 Long Time Technology.Co.Ltd
6F.,No.237, Sec 1, Datong Rd.,Xizhi Dist.,New Taipei City 22161,Taiwan (R.O.C.)
TEL: +886-2-26903311
FAX: +886-2-26903322

Manufacture Factory

〇 Long Time Electronic Materials.Co.Ltd
Guangdong Jiangmen Xinhui Yamen Fixed-point Electroplating Industrial Base
TEL: +86-750-6438198
FAX: +86-750-6438199

〇 Shanggao Long Time.Co.Ltd
Jiangxi Yichun Shanggao Industrial Park
TEL: +86-0795-2505555
FAX: +86-0795-2505569

LT-ZH-9X-380 SiO/C

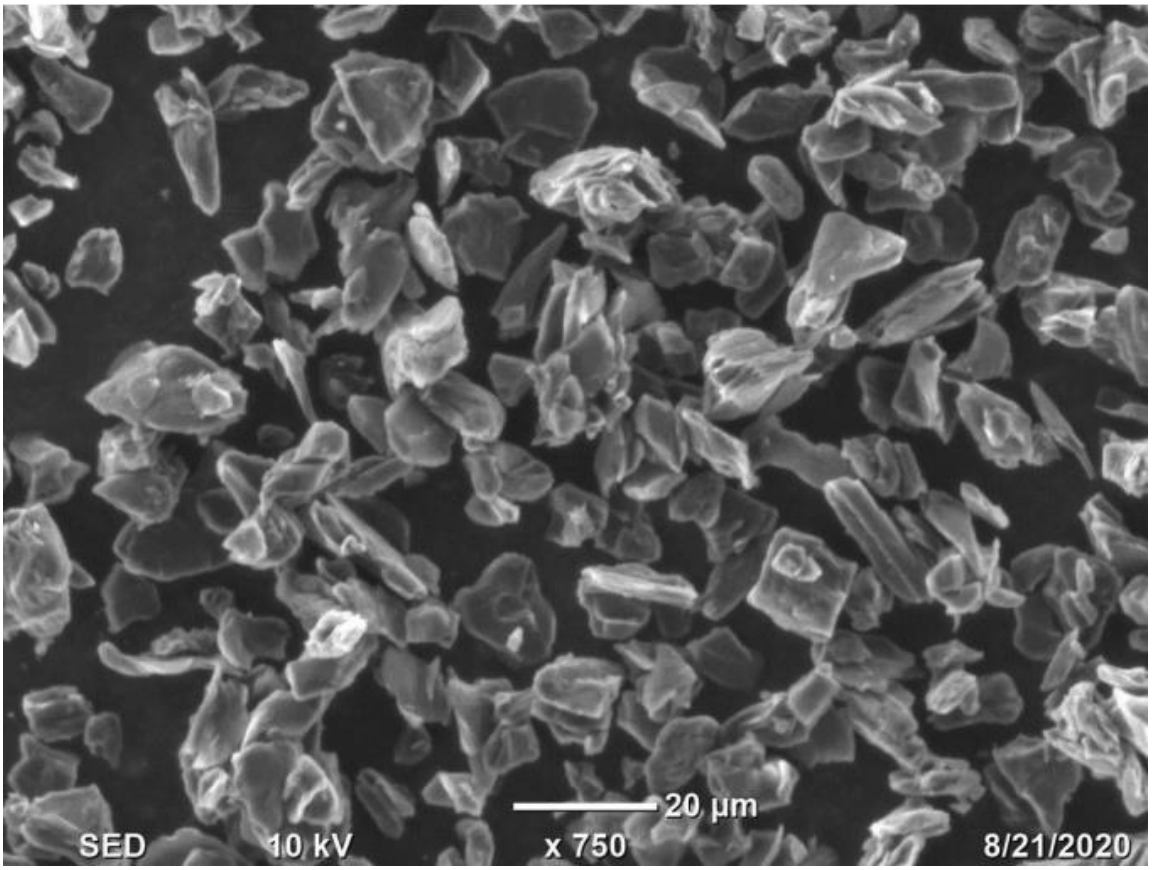
Specification

Item		Unit	Specification	Method
Particle Size	D_{10}	μm	5 - 9	**GB/T 24533-2009** App. A (0.2 ml 10% NP-40 solution was used to improve dispersion of graphite in water.)
	D_{50}		11 - 15	
	D_{90}		≤33	
Tap density		g/cm^3	≥ 0.95	**GB/T 24533-2009** App. M
Specific surface area		m^2/g	≤ 2.0	**GB/T 24533-2009** App. D
Moisture content		%	≤ 0.20	**GB/T 3521-2008**
1^{st} Discharge cap.		mAh/g	≥ 380	Half cell test (CR2032) in the range of **0.001 – 2 V at 0.1 C**
1^{st} Coulombic eff.		%	≥ 92	

LT-ZH-9X-380 SiO/C

Features

- Stable and uniform material structure
- Stable cyclic performance
- Good battery safety
- Applied in:
  Square and cylindrical battery



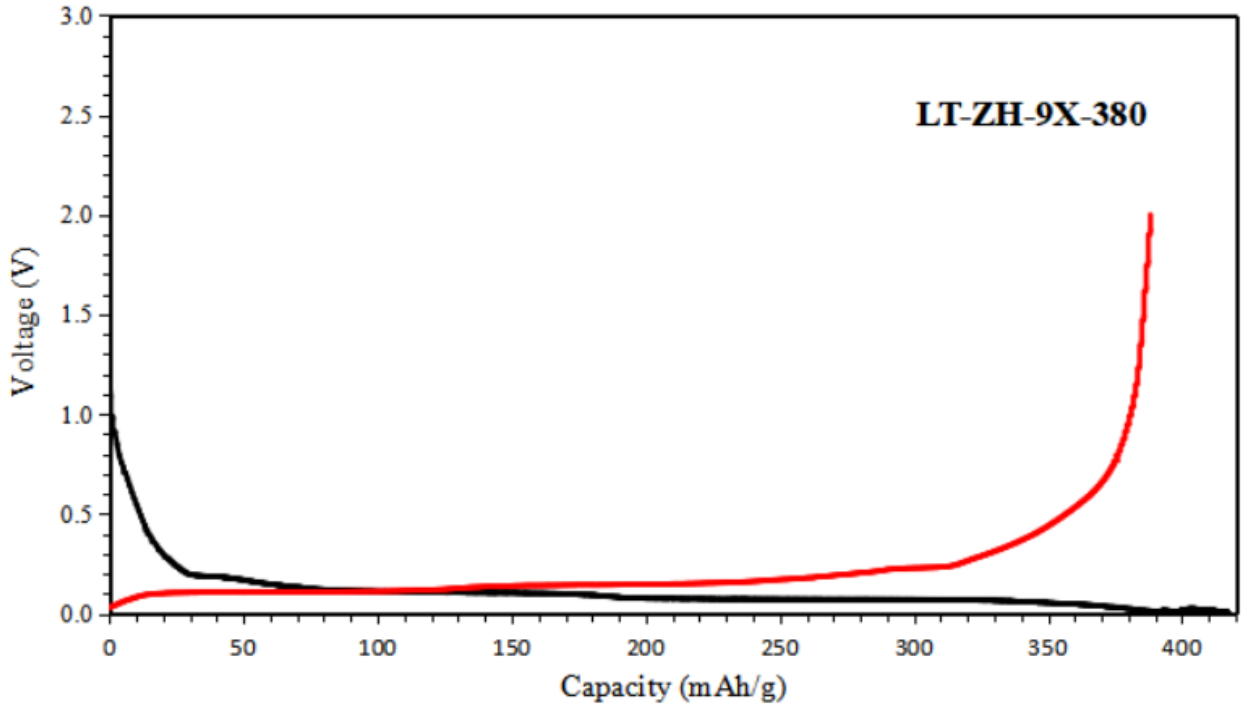
LT-ZH-9X-380 SiO/C (SEM)

LT-ZH-9X-380 SiO/C

Half cell test (CR2032)

Item							Remark
Components	1	Work electrode	Powder	Name	Chemicals	Ratio	—
				Active material	**LT-ZH-9X-380**	95.5%	—
				Conductive agent	Super P	1.0%	**Timcal** Super P
				Binder	CMC	1.5%	**WEDAFR** H631K
					SBR	2.0%	**NIPPON A&L INC.** SN-307R
			Solvent		H_2O		—
	2	Counter electrode	Metallic lithium				—
	3	Electrolyte	1 M $LiPF_6$ in EC: DMC: EMC(1:1:1 vol.%) with 1wt.% VC.				—

		Rest Time	Current	Voltage	
Testing	1	10 min	0.05 C	≤ 5 mV	—
	2	10 min	200 μA	≤ 5 mV	
	3	5 min	50 μA	≤ 5 mV	
	4	5 min	0.10 C	≥ 2,000 mV	



Charge-Discharge Curves

LT-ZH-9X-380 SiO/C

Suggest preparation method of electrode for full cell

Item						Dose or Range	Unit	Remark
0	Plan	Total weight of powder				1,000.0	g	—
		Solid content of slurry (S/C)				47.1	%	—
1	Materials	Powder	Name	Chemicals	Ratio	—	—	—
			Active material	**LT-ZH-9X-380**	95.5%	955.0	g	—
			Conductive agent	Super P	1.0%	10.0	g	**Timcal** Super P
			Binder	CMC	1.5%	15.0	g	**WEDAFR** H631K (1%Vis.:1000-1200 mPas)
				SBR	2.0%	41.7	g	**NIPPON A&L INC.** SN-307R(S/C=48%)
		Solvent		H_2O		1075.0	g	
				NMP		25.0	g	
2	Slurry viscosity					2,500-4,000	cps	—
3	Coated surface density			Single layer		80-100	g/m^2	—
				Double layer		160-200	g/m^2	
4	Maximum electrode compacted density			Once		1.55	g/m^3	
				Twice		1.60	g/m^3	

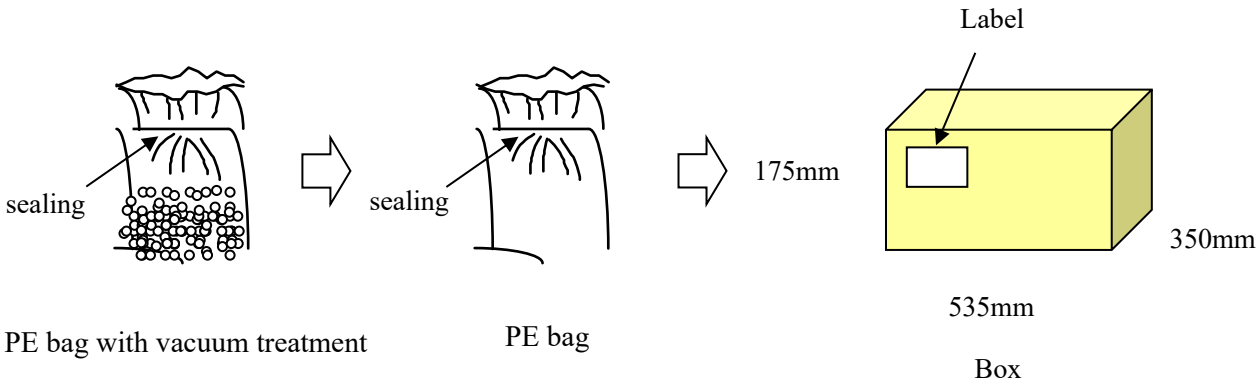
Methods

Order	Materials	Weight	Rotate	Revolution	Time	Slurry Temperature	Vacuum Treatment	Solid Content
		g	rpm	rpm	min	℃		%
1	Solvent—H2O	225	-	-	-	20 -30	Off	**2.2**
2	Binder—CMC	15	-	-	-	20 -30	Off	
3	Solvent—H2O	450	40	2,600	10	20 -30	Off	
		-	60	3,600	120	20 -30	On	
4	Conductive agent—Super P	10	40	2,600	10	20 -30	Off	3.6
		-	60	3,600	60	20 -30	On	
5	Active material —**LT-ZH-9X-380**	955	-	-	-	20 -30	Off	50.1
6	Solvent—H2O	300	40	260	10	20 -30	Off	
		-	60	3,600	180	20 -30	On	
7	Binder—SBR	41.7	-	-	-	20 -30	Off	47.1
8	Solvent—NMP	25	-	-	-	20 -30	Off	
9	Solvent—H2O	100	40	2000	60	20 -30	On	

LT-ZH-9X-380 SiO/C

Packing

1. **Specifying**: 25 Kg/Box
2. **1st packing:** PE bag with vacuum treatment
3. **2nd packing:** PE bag
4. **3rd packing:** Paper box packing with label (including: Name, Lot No., MFD)



Storage Condition

1 Suggest storage temperature and humidity controlled below 40℃ and 60%RH respectively, for brand new; After opening, please use it up as soon as possible.

2 After opening for 1 hour, it is a natural phenomenon for moisture regain, implying that moisture content of powder could be increased to 3000 ppm. Suggest drying it again before use.