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Long Time Tech. Co., Ltd.

Anode Materials for Li-ion Battery

Product : Artificial graphite

Product Name : LT-ZH-6

Version : IB

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LT-ZH-6 Artificial graphite

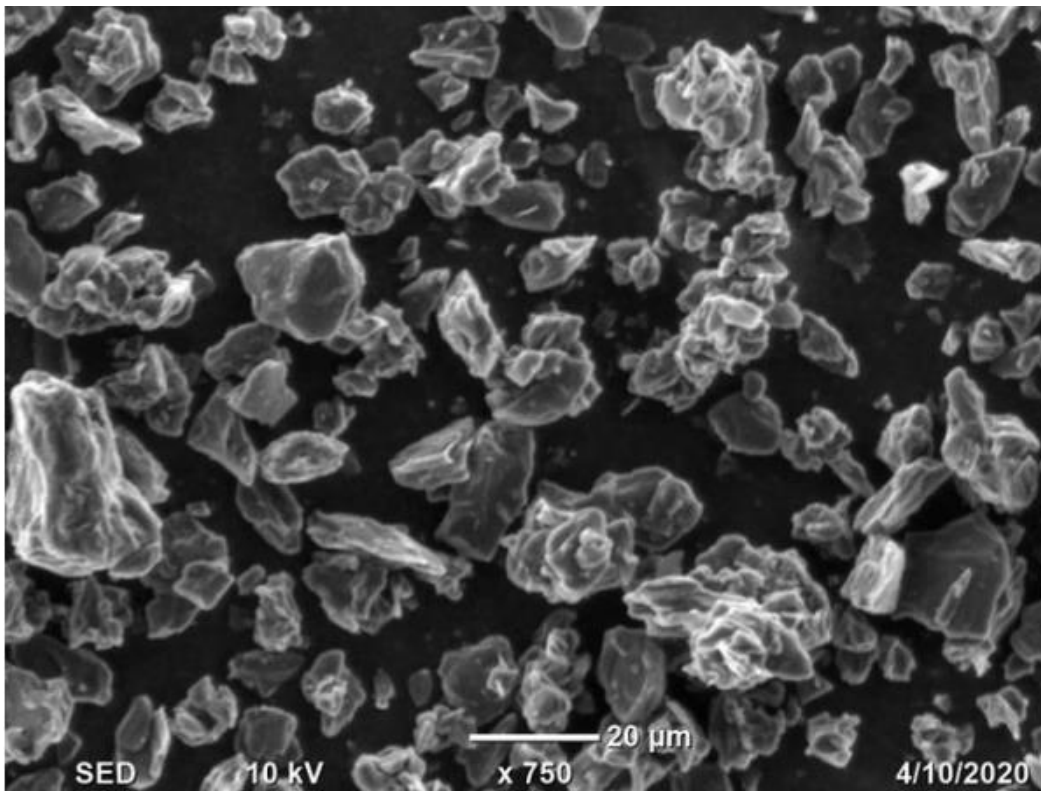
Specification

Item		Unit	Specification	Method
Particle Size	D ₁₀	μm	4 - 8	GB/T 24533-2009 App. A (0.2 ml 10% NP-40 solution was used to improve dispersion of graphite in water.)
	D ₅₀		14 - 18	
	D ₉₀		≤32	
Tap density		g/cm ³	≥1.00	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
Ash content		%	≤ 0.05	GB/T 3521-2008
Fixed carbon content		%	≥ 99.95	GB/T 3521-2008
True density		g/cm ³	≥ 2.20	GB/T 24533-2009 App. E
1 st Discharge cap.		mAh/g	≥ 343	Half cell test (CR2032) in the range of 0.001 – 2 V at 0.1 C
1 st Coulombic eff.		%	≥ 92	

LT-ZH-6 Artificial graphite

Features

- Stable and uniform material structure
- Stable cyclic performance
- Good battery safety
- Good compacted density ($\leq 1.57\text{g/cm}^3$) (twice press rolling)
- Applied in:
Square, cylindrical and pouch battery

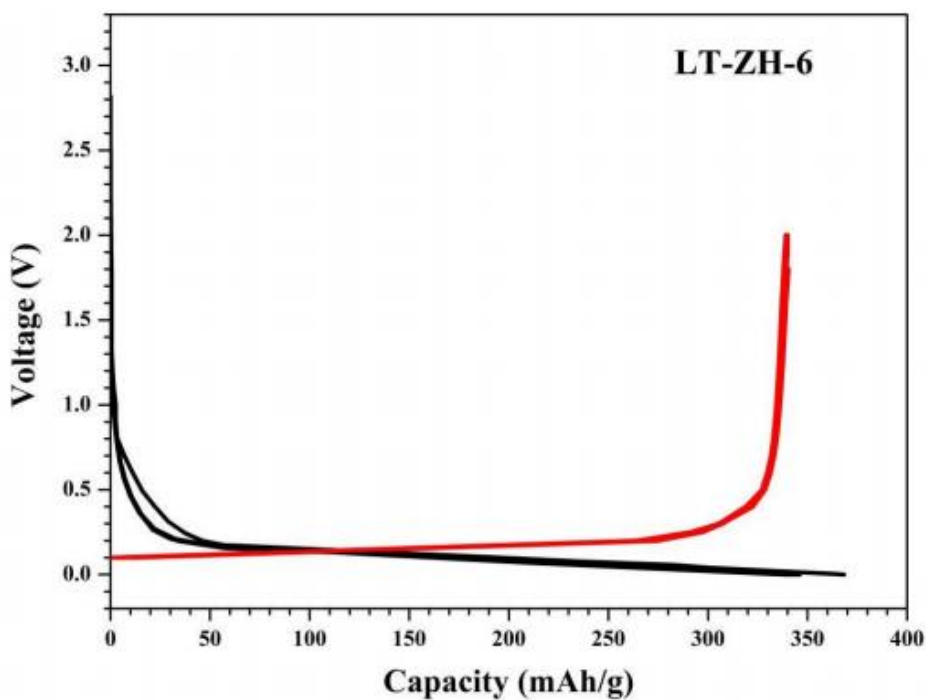


LT-ZH-6 Artificial graphite (SEM)

LT-ZH-6 Artificial graphite

Half cell test (CR2032)

Item							Remark
Components	1	Work electrode	Powder	Name	Chemicals	Ratio	—
				Active material	LT-ZH-6	93.3%	—
				Conductive agent	Super P	3.0%	Timcal Super P
				Binder	CMC	1.2%	DKS CELLOGEN 3H
	SBR	2.5%	NIPPON A&L SBR SN-307R (S/C=50%)				
	Solvent			H ₂ O		—	
2	Counter electrode	Metallic lithium				—	
3	Electrolyte	1 M LiPF ₆ in EC: DMC: EMC(1:1:1 vol.%) with 1wt.% VC.				—	
Testing	The specific capacities measured in the voltage range of 0.001 - 2 V vs. Li/Li ⁺ at 0.1 C.					—	



Charge-Discharge Curves

LT-ZH-6 Artificial graphite

Suggest preparation method of electrode for full cell

Item					Dose or Range	Unit	Remark	
0	Plan	Total weight of powder			2,000	g	—	
		Solid content of slurry (S/C)			43.01	%	—	
1	Materials	Powder	Name	Chemicals	Ratio	—	—	
			Active material	LT-ZH-6	95.0%	1900	g	—
			Conductive agent	Super P	1.0%	20	g	Timcal Super P
			Binder	CMC	1.5%	30	g	DKS CELLOGEN 3H
		SBR		2.5%	100	g	NIPPON A&L SBR SN-307R (S/C=50%)	
Solvent	H ₂ O	2600	g	—				
2	Slurry viscosity				1,000 - 3,000	cps	—	
3	Coated surface density		Single layer	48	g/m ²	—		
			Double layer	96	g/m ²			

Methods

1. Measure **2300g** of distilled water in a container.
2. Add **30 g** of CMC, rotate 10 Hz, revolution 15 Hz, 10 min.
3. Stir quickly and rotate 35 Hz, revolution 30 Hz, 90 min (Degree of Vacuum-0.09 mPa, Turn off recirculating water).
4. Add **20 g** of Super P, rotate 10 Hz, revolution 15 Hz, 10 min.
5. Stir quickly and rotate 35 Hz, revolution 30 Hz, 120 min (Degree of Vacuum-0.09 mPa, Turn off recycling water).
6. To understand the degree of dispersion of granule, fineness of the electric conductive slurry is tested. (Keep stirring for 30 mins more if it is not fine enough).
7. Add **950 g** of LT-ZH-6, rotate 10 Hz, revolution 15 Hz, 10 min.
8. Add **950 g** of LT-ZH-6 again, rotate 10 Hz, revolution 15 Hz, 10 min.

LT-ZH-6 Artificial graphite

9. Stir quickly and rotate 35 Hz, revolution 30 Hz, 120 min (Degree of Vacuum-0.09 mPa, Turn on recirculating water, keep the slurry under temperature of 25 - 28 °C).
10. To understand the degree of dispersion of granule, fineness of the electric conductive slurry is tested. (Keep stirring for 30 mins more if it is not fine enough).
11. Add **100 g** of SBR adhesive, add **300 g** of distilled water and stir quickly, rotate 35 Hz, revolution 35 Hz, 60 min. (Degree of Vacuum-0.09 mPa, Turn on recirculating water, keep the slurry under temperature of 25 - 28 °C).
12. To make sure the slurry fulfilled the condition of coating, Sieved the electrode slurry (**120 mesh**), and level of degree of fineness and viscosity is measured.

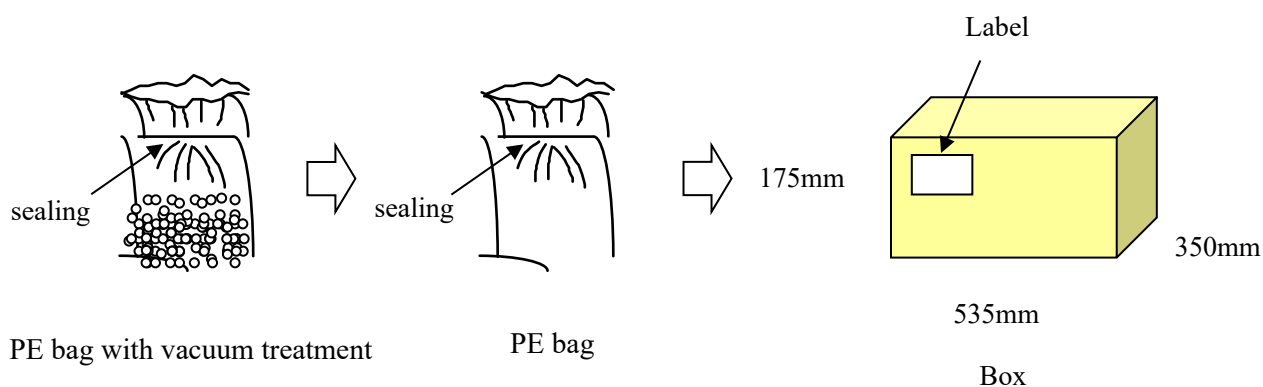
※ Mix the powder and solution under low speed to ensure the solution moisten the powder, to prevent the agglomeration.

※ The procedure may vary from different device condition.

LT-ZH-6 Artificial graphite

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°C 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.