榮 炭

Long Time Tech. Co., Ltd.

Anode Materials for Li-ion Battery

Product： MCMB

Product Name： LT-PWSH

Version： ID

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LT-PWSH MCMB

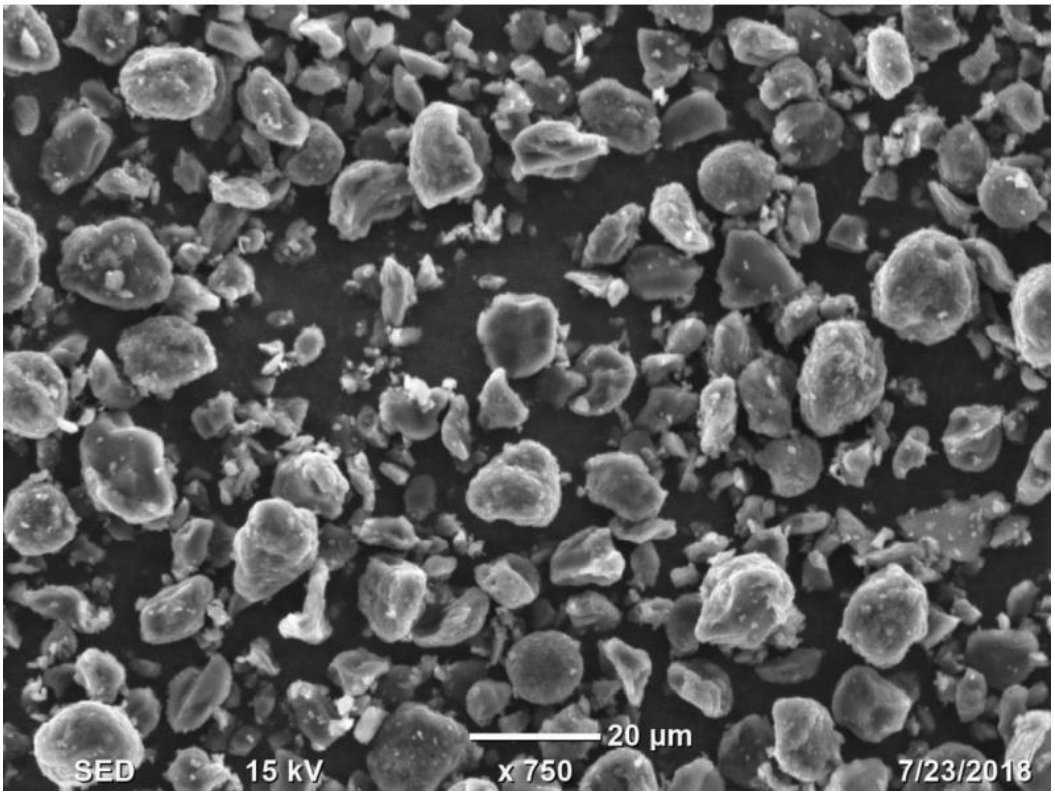
Specification

Item		Unit	Specification	Method
Particle Size	D_{10}	μm	2 – 5	**GB/T 24533-2009** App. A (0.2 ml 10% NP-40 solution was used to improve dispersion of graphite in water.)
	D_{50}		8 - 12	
	D_{90}		≤ 40	
Tap density		g/cm^3	≥ 1.20	**GB/T 24533-2009** App. M
Specific surface area		m^2/g	≤ 3.0	**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	≥ 345	Half cell test (CR2032) in the range of **0.001 – 2 V at 0.1 C**
1^{st} Coulombic eff.		%	≥ 93	

LT-PWSH MCMB

Features

- Easy preparation of electrode
- Low electrode resilience
- Stable cyclic performance
- Excellent rate capability
- Applied in:
  High power cylindrical and pouch battery



LT-PWSH MCMB (SEM)

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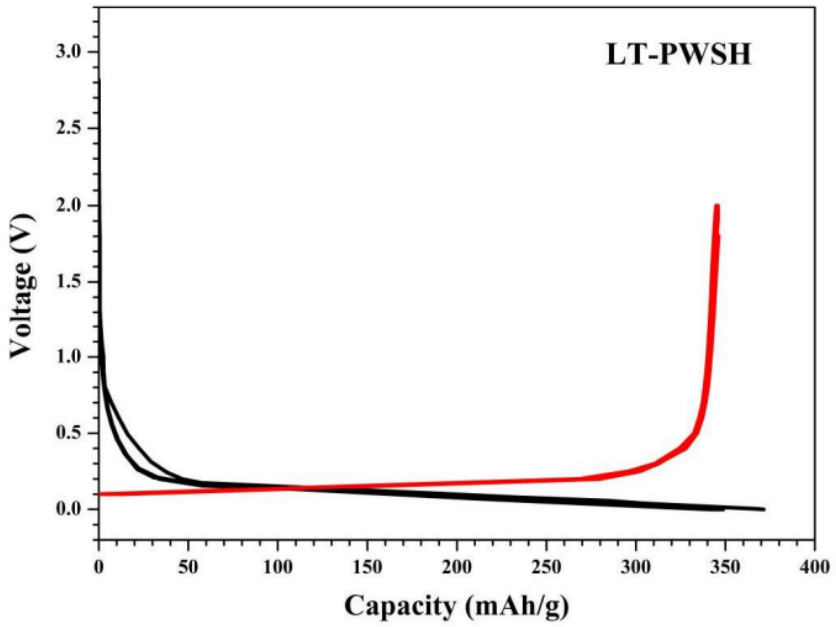
Half cell test (CR2032)

Item							Remark
Components	1	Work electrode	Powder	Name	Chemicals	Ratio	–
				Active material	**LT-PWSH**	92%	–
				Conductive agent	Super P	3%	
				Binder	PVdF	5%	
			Solvent		NMP		–
	2	Counter electrode	Metallic lithium				–
	3	Electrolyte	1 M $LiPF_6$ in EC: DMC: EMC(1:1:1 vol.%) with 1wt.% VC.				

Testing		Rest Time	Current	Voltage	
	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

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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-PWSH	94.5%	945.0	g	–
			Conductive agent	Super P	2.0%	20.0	g	
			Binder	CMC	1.5%	15.0	g	
				SBR	2.0%	41.7	g	**NIPPON A&L** SN-307R (S/C=48%)
		Solvent		H_2O		1075.0	g	–
				NMP		25.0		
2	Slurry viscosity					2,500 – 4,000	cps	–
3	Coated surface density				Single layer	48	g/m^2	–
					Double layer	96	g/m^2	

Method

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	20	40	2,600	10	20 -30	Off	4.9
		-	60	3,600	60	20 -30	On	
5	Active material－**LT-PWSH**	945	-	-	-	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	

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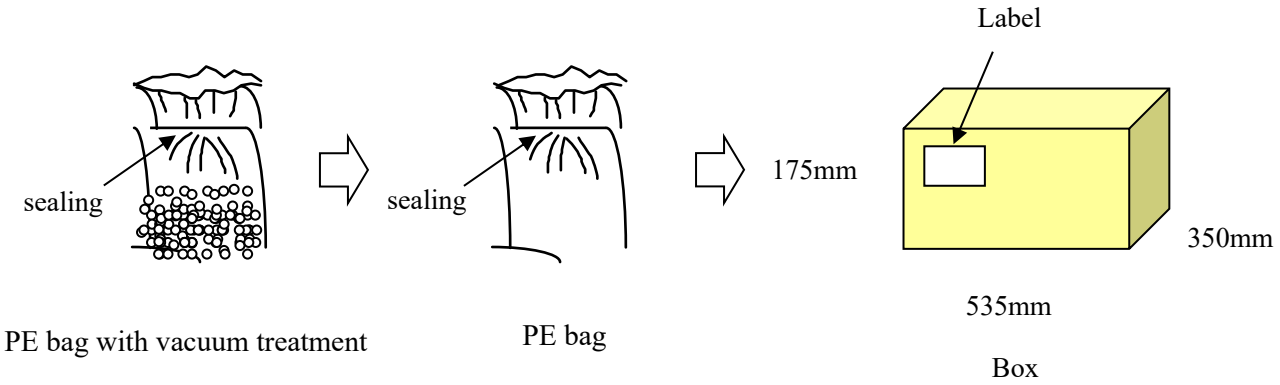
Packing

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.