

Ref. No.: CSG17/PS202112/01

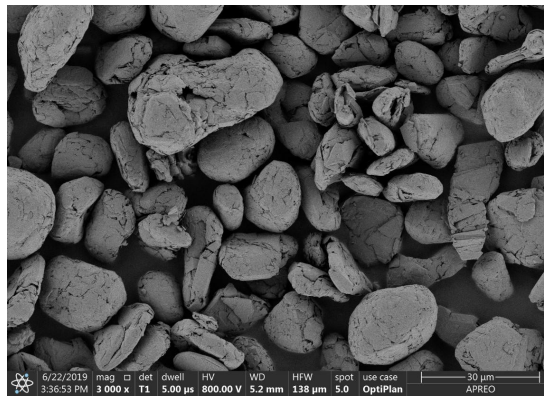
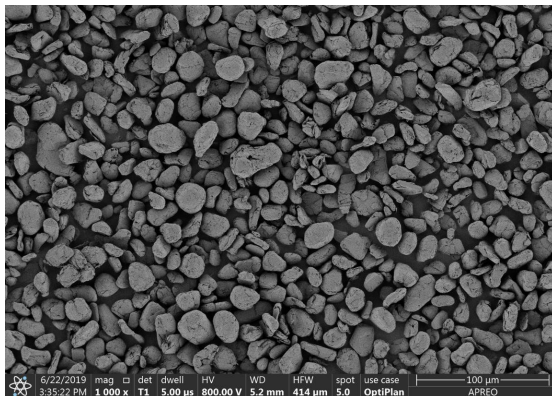
Last Update: 6 December 2021

CSG-17 Product Specification

Applications: high-capacity cylindrical, square batteries.

1. Technical characteristics:
CSG-17 is a pitch coated natural graphite product which has the characteristics of high volumetric, high pellet density, low self-discharge rate, good permeability, high cost performance.
2. Suggested Usage: (For reference only)
Suitable for aqueous lithium-ion batteries with design specific capacity 350-355mAh/g, pellet density control 1.60-1.70g/cm³.

Scanning Electron Microscope



3. Technical Data

Item	Unit		Typical Value	Specification	Method/Instrument
Particle Size	D10	μm	11.040	>9.5	Laser diffraction Malvern Mastersizer 3000
	D50	μm	17.597	16.0-19.0	
	D90	μm	27.759	<32	
Tap Density	g/ml		1.07	1.0-1.2	Central Iron & Steel Research Institute Model: FZS4-4B
Special Surface Area	m ² /g		2.45	1.5-3.0	Multi point BET (adsorption N ₂) Quantachrome Nova 4000E
Moisture	%		0.08	≤0.1	Gravimetric method Sartorius Infrared Moisture Analyzer Model: MA-100
Carbon content	%		99.99	≥99.95	Muffle furnace 950°C
Ash	%		0.012	≤0.05	
Fe	ppm		25	≤30	ICP-OES Model: Thermo Fisher
Fe+Cr+Ni+Zn	ppm		0.7	≤1	
S	ppm		33	≤50	Sulfur content analyzer
Pellet Density	g/cm ³		1.67	1.60-1.70	Guangzhou Lange Electronics Model: CLG-ZM-400Y
Specific Capacity	mAh/g		363	>360	Half-Cell Testing, using lithium metal as counter electrode
Initial Coulombic Efficiency	%		92.7	≥92	Arbin multifunctional battery testing equipment Model: BT2000

4. Formulation and procedures of anode material production: (For reference only)

Proportion	CSG-17 : CMC : SBR : SP = 95.5 : 1.5 : 2.0 : 1
Bonding Agent	CMC2200 (Japan Daicel Corporation) SBR307 (Nippon A&L Inc.)
Solid content	45%
Viscosity	3000 mpa.s
Mixing equipment	Blender (Hongyun)

Feeding order and procedures:

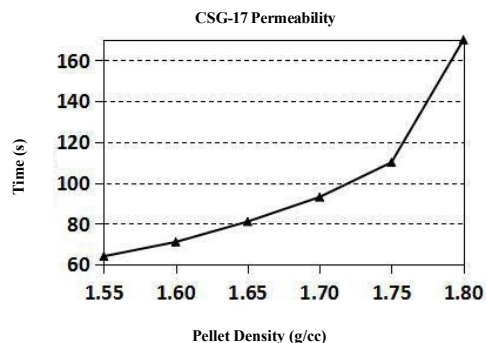
1. After being weighted, CMC be put into 90% first batch of water and mix for 2.0 hours (rotation/revolution speed: 30/25Hz).
2. Add Super-p and mix for 2.0 hours (rotation/revolution speed 30/25Hz).
3. Add CSG-17 and mix for 2.0 hours (rotation/revolution speed 20/25Hz).
4. Add SBR and mix for 1.5 hours (rotation/revolution speed 25/20Hz).
5. Measure the viscosity.
6. Depends on the viscosity, add 10% second batch of water and mix 1.0 hour (rotation/revolution speed 30/25Hz). Adding second batch of water is for adjusting viscosity purpose.
7. Mix at a low speed for 30 minutes (rotation/revolution speed 5/10Hz).

5. Absorbent permeability test in different pellet density

Measurement setup:

Absorbent:

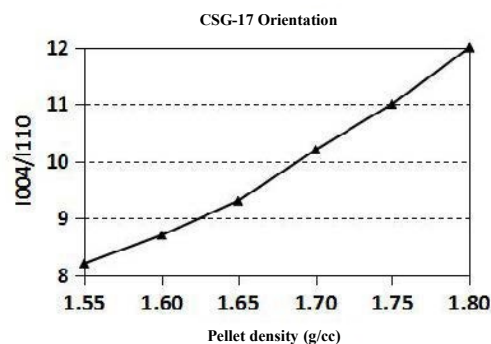
LiPF6: 1mol/L,
EC : DEC : DMC = 1 : 1 : 1,
Volume: 1μL



6. Test of orientation in graphite sheet electrode

Measurement setup:

1. Equipment: X-ray diffraction (XRD)
2. Graphite sheet electrode
3. formulation:
CSG-17 : CMC : SBR : SP = 95.5:1.5: 2.0: 1
Coating: single side
Cufoil: 12μm
4. Scan speed: 0.082
5. Scan step size: 0.0066
6. Scan angle: I004 (52~56 degree); I110 (75~79 degree)



7. Charge/Discharge Scheme

1. Constant-current charging (0.5C, 4.3V)
2. Constant-voltage charging (4.3V, current 48mA)
3. Rest period (10min)
4. Constant-current discharging (0.5C, 3.0V)
5. Rest period (10min)
6. Cycling performance (>300 weeks)

8. Environmental compliance of product

The product complies with EU RoHS Directive (Restriction of Hazardous Substances in Electrical and Electronic Equipment), the concentration of toxic and hazardous substances or elements contained in the product does not exceed the limit specified in SJ/T 11363-2006 “Limit Requirements for Toxic and Hazardous Substances in Electronic Information Products”.

9. Packaging and labelling

The product is packaged by a vacuum packaging machine, first put into an inner film bag, formed, heat-sealed, and then put into a carton with a net weight of 25.0 ± 0.1 kg/carton, or packed according to customer requirements.

The packaging label includes: product name, batch number, packaging specification, production date, factory date, order number, inspection mark, RoHS mark, as well as company name, LOGO, and other customized information.

10. Storage and Transportation

The product should be stored in a ventilated and dry warehouse and avoid mixing with materials that can deteriorate the product or damage the packaging bag during storage and transportation.

Unopened product has 1 year of durability period. Opened product should be used within one month and kept clean and dry.