



Mobile
Energy

CONDUCTIVE CARBON BLACK FOR LITHIUM-ION BATTERIES

C-ENERGY™ CARBON BLACK

C-ENERGY™ CARBON BLACKS MEET THE SEVEREST PURITY REQUIREMENTS

Imerys Graphite & Carbon C-ENERGY™ carbon blacks meet the severest purity requirements for low metallic impurities and grit. The primary benefit of use these extremely clean carbon blacks is to give electrical conductivity to lithium-ion battery electrodes at low to very low loadings.

KEY FEATURES

Imerys Graphite & Carbon's proprietary production process generates the controlled production of extremely clean carbon blacks. Imerys Graphite & Carbon's commitment to continuously improve the purity of its carbon blacks results in a significant reduction of metallic impurities and grit in every new product launched. Reducing contamination and oversize contributes to the reduction of the OCV (open circuit voltage) rejection rate.

Table 1. Properties of Imerys Graphite & Carbon high purity carbon blacks

PROPERTIES	NORMS	UNITS	SUPER PLi	C-ENERGY™ SUPER C65	C-ENERGY™ SUPER C45
Absorption stiffness value	Int. method 01	ml/5g	32	32	36
BET surface area	ASTM D3037	m ² /g	62	62	45
Ash content	ASTM D1506	%	0.05 max	0.025 max	0.025 max
Grit 45 µm / 325 mesh	ASTM D1514	ppm	<2	<2	<2
Grit 20 µm / 625 mesh	ASTM D1514	ppm	<15	<10	<10
Metallic (magnetic) impurities	Int. method SEM-EDX	particles in 1 g	0.70 100%	0.12 17%	0.12 17%
Metallic impurities	Int. method XRF	particles in 1 g	0.60	0.30	0.30
Iron	Int. method 20 ICP	ppm	5	1	5
Nickel	Int. method 20 ICP	ppm	<1	<1	<1
Cobalt	Int. method 20 ICP	ppm	<1	<1	<1

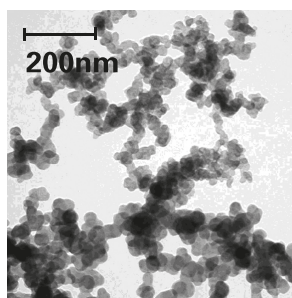


www.imerys-graphite-and-carbon.com

C-ENERGY™

Super C65

Conductive Carbon Black



Transmission electron microscopy

Imerys Graphite & Carbon's production process delivers carbon blacks with a unique combination of high structure and low surface area, which guarantees very good dispersion in electrode slurries. Thanks to their lower surface area, C-ENERGY™ products exhibit lower moisture pick-up than higher surface area carbon blacks.

In addition, Imerys Graphite & Carbon's production process delivers very graphitic carbon blacks, with a lower number of oxygenated groups on their surface than furnace carbon blacks with the same surface area, making them more hydrophobic and ensuring excellent system stability.

Table 2. Metallic impurities detected by XRF in 150 g of Super PLi and Super C65 (examples).

SPECIES	SUPER PLI	C-ENERGY™ SUPER C65
Fe	46	12
FeZn	0	0
FeCu	0	0
FeCuZn	0	0
FeCr	4	0
FeCrNi	0	0
Fe + a (Mn, Co..)	32	23
Cu	0	1
Zn	0	6
Zn + a (Mn, Co..)	10	1
CuZn	2	2
Ti	0	0
Mn	0	0
Co	0	0
MnCoNi	0	0
others	6	12
Total impurity	100	57

Imerys Graphite & Carbon high purity carbon blacks show the same percolation behaviour in powder mixtures (Fig. 1a) and in electrodes (Fig. 1b), thus they are interchangeable in LIB electrode formulations.

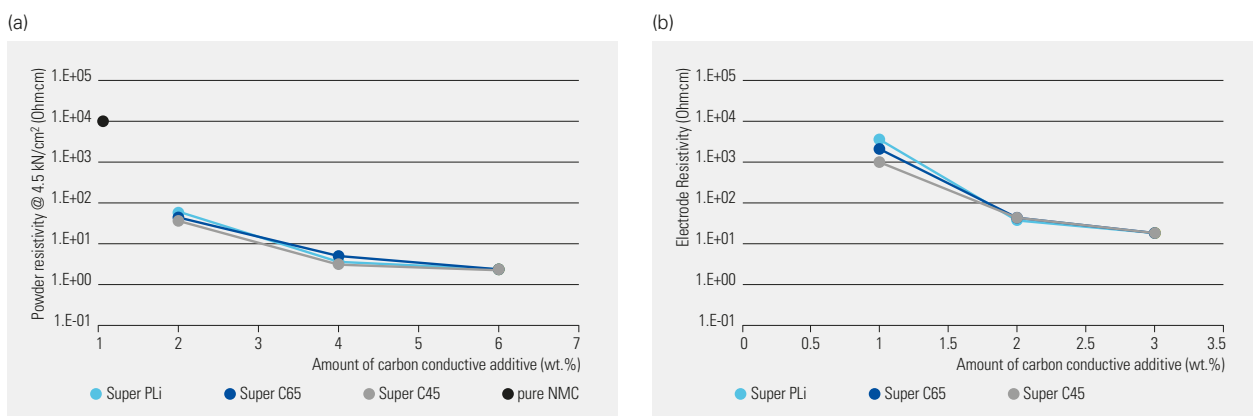


Figure 1. Resistivity of powder mixtures containing NMC active material blended with different amounts of Imerys Graphite & Carbon high purity carbon black (a) and resistivity of NMC based electrodes containing different amounts of Imerys Graphite & Carbon high purity carbon black (b).