SPECIALTY GRAPHITE FOR
POSITIVE ELECTRODES
OF LITHIUM-ION BATTERIES

C-NERGY™
Graphite

C-NERGY™ L-SERIES is a specialty graphite range especially designed for positive electrodes of lithium-ion batteries.

**Key Features**
- Enables reduced additive dosage in the positive electrode
- Enables the utilization of more economical active materials in the positive electrode
- No additional pre-dispersing unit is required
- No need for a dispersing agent
- Faster electrolyte absorption
- Reduced solvent consumption
- Higher production output

<table>
<thead>
<tr>
<th>PRODUCT CHARACTERISTICS</th>
<th>APPLICATION BENEFITS</th>
</tr>
</thead>
</table>
| Very High Purity                               | Increased battery safety  
Ultra low metal impurities  
Ultra low ionic impurities                                      |
| Very High Electrical Conductivity              | High electrode capacity  
High energy density  
High cycling stability  
High power density  
Low dosage required vs conventional graphite grades |
| High Density and Low Spring Back               | High energy density  
High power density  
Minimal electrode expansion after pressing  
Improved electrode flexibility  
Facilitates the addition of other conductive additives |
| Very Efficient Electrolyte Wettability         | Cost reduction due to faster electrolyte filling step during battery assembly  
Rapid electrolyte absorption  
High electrical conductivity |

www.imerys-graphite-and-carbon.com
The unique characteristics of C-NERGY™ L-grades give unmatched performance improvements in Li-ion batteries.

**Recommended C-NERGY™ L-grades dosage in positive active material: 1-3 wt.%**

C-NERGY™ L-grades build a graphite matrix that facilitates the addition of other conductive additives.

Better performance is obtained when C-NERGY™ L-grades are used in combination with ca. 1 wt.% of C-NERGY™ SUPER C65 or C-NERGY™ SUPER C45 carbon black.

### Typical Product Properties

<table>
<thead>
<tr>
<th></th>
<th>Ash (%)</th>
<th>Fe (ppm)</th>
<th>Cl (ppm)</th>
<th>SO₄²⁻ (ppm)</th>
<th>AMOUNT OF MAGNETIC PARTICLES/GRAM OF PRODUCT</th>
<th>TIME TO ADSORB DMC ELECTROLYTE SOLVENT (msec) (1)</th>
<th>IN-PLANE ELECTRICAL CONDUCTIVITY OF LFP ELECTRODES AT 2wt% OF GRAPHITE (mΩ·cm⁻¹) (2)</th>
<th>IN-PLANE ELECTRICAL CONDUCTIVITY OF NMC ELECTRODES AT 2wt% OF GRAPHITE (mΩ·cm⁻¹) (2)</th>
<th>DENSITY OF LFP ELECTRODES AT 2wt% OF GRAPHITE (g/cm³) (3)</th>
<th>DENSITY OF NMC ELECTRODES AT 2wt% OF GRAPHITE (g/cm³) (3)</th>
<th>SPRING-BACK (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFG6L</td>
<td>0.01</td>
<td>10</td>
<td>5</td>
<td>25</td>
<td>&lt;1</td>
<td>200</td>
<td>32</td>
<td>52</td>
<td>2.2</td>
<td>3.0</td>
<td>10</td>
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<tr>
<td>SFG6</td>
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<td>10</td>
<td>40</td>
<td>3</td>
<td>300</td>
<td>29</td>
<td>46</td>
<td>2.2</td>
<td>3.0</td>
<td>10</td>
</tr>
<tr>
<td>KS6L</td>
<td>0.01</td>
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<td>5</td>
<td>25</td>
<td>&lt;1</td>
<td>200</td>
<td>31</td>
<td>51</td>
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<td>12</td>
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<tr>
<td>KS6</td>
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<td>75</td>
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<td>40</td>
<td>4</td>
<td>200</td>
<td>29</td>
<td>41</td>
<td>2.2</td>
<td>3.0</td>
<td>12</td>
</tr>
</tbody>
</table>

More data available upon request

1) Defined as time it takes to reach a contact angle of 0°

2) Measured in presence of 1wt% of C-NERGY™ SUPER C65, not densified

3) Measured in presence of 1wt% of C-NERGY™ SUPER C65, densified uniaxially at 32 kN/cm²

### BENEFITS

The use of 1-3 wt.% C-NERGY™ SFG6L and C-NERGY™ KS6L in the positive electrode leads to:

- Cost savings resulting from reduced additive dosage in the positive electrode
- Cost savings due to utilization of more economical active materials in the positive electrode
- Increased mechanical stability and density of the electrode
- Eliminates the requirement for additional pre-dispersing unit
- No dispersing agent needed
- Faster electrolyte absorption
- Reduced consumption of solvents
- A graphite matrix that facilitates the addition of other conductive additives
- Higher production outputs