Schunk Mobility Carbon

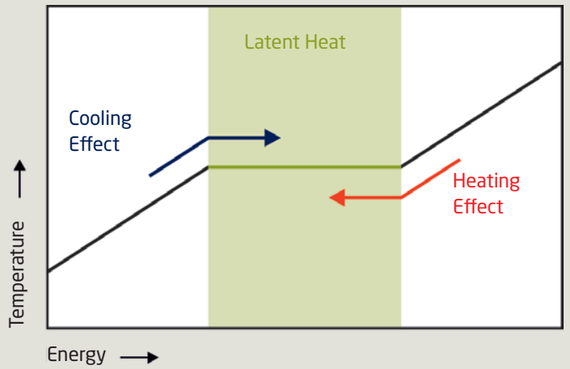
Latent Heat Carbon

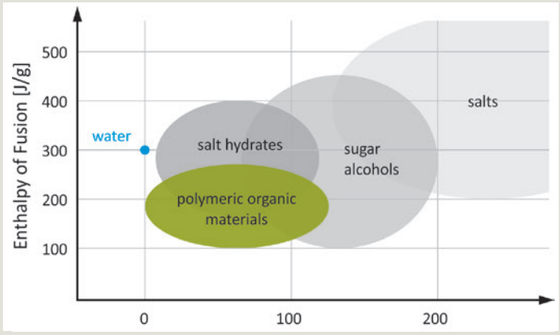
Thermal runaway propagation prevention for lithium-ion battery modules with cylindrical cells

schunk-mobility.com

LATENT HEAT CARBON – EFFECTIVE ENERGY STORAGE IN TRANSIENT AND PULSED SYSTEMS

Latent Heat Carbon (LHC) is a composite material consisting of a graphite and a phase change material (PCM). It can be used for effective energy storage as it combines a high thermal capacity with an efficient heat transfer to rapidly absorb any temperature spikes. Additionally, the material is very lightweight, making it particularly interesting for mobile applications, especially in the aerospace sector.





By combining the phase change materials with graphite, Schunk can increase this low thermal conductivity up to 150-fold, leading to a significantly improved heat transfer.

Schunk can produce tailor-made LHC materials and components for various transient energy storage applications that require a fast response time and lightweight material solutions.

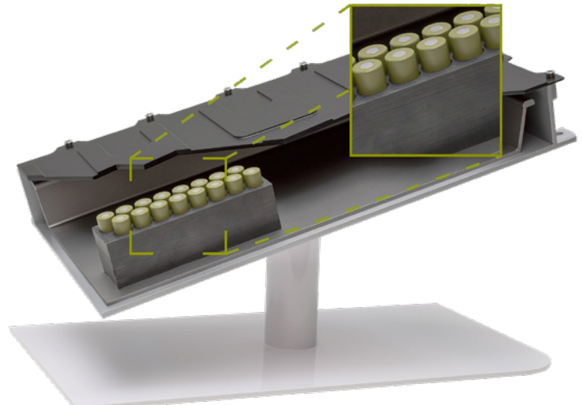
Phase Change Materials

Phase change materials are characterized by their ability to absorb or release a large amount of thermal energy during a phase transition, such as from solid to liquid or vice versa. The energy required to change matter from solid to liquid is called enthalpy of fusion or simply latent heat.

There are various types of PCMs available on the market, starting from water, over polymeric organic materials to eutectic alloys. These materials are characterized by their specific enthalpy of fusion and their well-defined phase transition temperatures. However, most of them exhibit also a massive drawback which is their very low thermal conductivity that limits the energy storage effectiveness.

LATENT HEAT CARBON CELL HOLDERS FOR CYLINDRICAL LITHIUM-ION BATTERY CELLS

Latent Heat Carbon finds applications in battery thermal management. Cell holders made of LHC70 prevent thermal propagation in case of a thermal event by rapid absorption of thermal energy from damaged cells. Additionally, the high thermal conductivity of the composite also ensures a proper temperature uniformity across the battery module during normal operation.



	LHC70
Enthalpy of Fusion [J/g]	195
Specific Heat Capacity [J/g.K]	1.7
Density [g/cm³]	0.9
Peak Melting Point [°C]	70 ± 1
Thermal Conductivity [W/m.K]	x/y: 15 W/m.K z: 7 W/m.K

Several types of rechargeable lithium-ion batteries are prone to thermal runaway. Schunk has demonstrated the effectiveness of Latent Heat Carbon cell holders to prevent an unwanted thermal event by conducting nail penetration tests.

LHC70, cell holder, 18650 cells, NMC, fully charged

The nail penetration tests showed that only the penetrated cell caught fire. The LHC cell holder effectively absorbed the thermal energy from the damaged cell so that no neighbouring cells were negatively affected. The fire was successfully extinguished after only a few seconds.

SCHUNK GROUP

ENGINEERING COMPETENCE IN MATERIALS TECHNOLOGY AND MECHANICAL ENGINEERING

The Schunk Group is a global technology group. The company is a leading supplier of products made of high-tech materials – such as carbon, technical ceramics and sintered metal – as well as machines and systems – from environmental simulation to air conditioning technology and ultrasonic welding to optical machines. The Schunk Group has around 10,000 employees in 26 countries and generated sales of €1.8 billion in 2024.

In the fast lane with innovative strength – as a component and development partner to the automotive industry, we provide mobility with components for power transmission and with tribologically highly resilient slide bearing and sealing elements made of carbon graphite, graphite and silicon carbide. With several hundred million carbon brushes per year in electric motors for starters, fans, petrol pumps and window regulators, we are the global leader.

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