

# HF-Scavenging for Li-Ion Batteries, EDLCs and Supercapacitors

Enhanced lifetime and safety through functional glass powders

Hydrofluoric acid (HF) is responsible for degradation and a shortened lifetime in numerous energy storage devices that use fluorine-containing organic electrolytes, e.g. lithium-ion batteries. Even small amounts of residual moisture (introduced during battery production) can result in the formation of highly corrosive HF inside the battery cells, since fluorine reacts violently with water. This can affect the electrolyte chemistry, leading to lower performance, failure of the device, or in worst case outgassing and leakage of the electrolyte.

## Product information

SCHOTT has developed a special glass powder to absorb hydrofluoric acid. Due to its special composition, the inorganic glass powder particles can scavenge fluorine ions and chemically bind them to the glass particle surface.

This binding is irreversible thereby permanently inactivating and preventing the formation of hydrofluoric acid in the battery system.

## Advantages of SCHOTT HF-scavenging glass powder

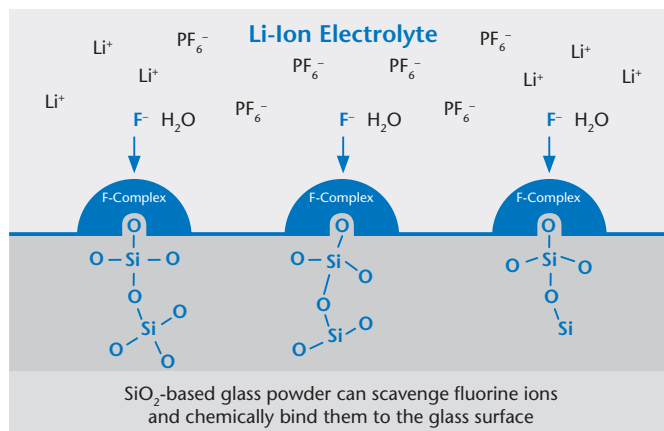
In comparison to standard separator coating materials, our glass powder provides the following additional benefits:

- **Significant increase of lifetime and safety of lithium-ion batteries, EDLCs and Supercaps (dependent on materials/chemicals used)**
- In case of thermal run-away, the glass powder particles remain in place and protect the electrodes from contacting each other, preventing a short circuit reaction.
- The world's first **inorganic** filler with HF-gettering function:
  - Chemically resistant to electrolytes
  - Electrochemically resistant even in high voltage applications
  - Temperature resistant up to several hundreds °C
  - Reduced abrasion in coating processes due to lower hardness in comparison to ceramic materials

## Applications

SCHOTT's HF-gettering glass powder is suitable as an additive for the separator, the electrode materials or as a coating on electrode materials in:

- Lithium-ion batteries
- Electric double layer capacitors (EDLC) or Supercapacitors
- It may also provide benefits for other applications, in which HF must be chemically bound



# HF Getter for Li-Ion Batteries, EDLCs and Supercapacitors

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## Material Data

HF Scavenging Glass G018-405		
Form of delivery/particle size	Glass powder with a mean particle size of 1µm or 0.7 µm (d50) and 90% of particles smaller than 5 µm (d90). Other grain sizes are available upon request.	
HF scavenging power	mg F / g glass	40 – 60
Coefficient of thermal expansion (-30 / +70 °C)	ppm/K	10.1
Max. operation temperature (ISO 7884-8)	°C	> 600
Density	g/cm <sup>3</sup>	4.1
Young's Modulus	GPa	68
Hardness (Knoop) HK0.1/20	–	440
Wettability with electrolyte (contact angle bulk [°])		15-30
Residual water Karl Fischer after drying 100 °C/4h/air	mg/cm <sup>3</sup>	6



## About SCHOTT

Based on more than 130 years of history, SCHOTT is a world leader in the development, melting and processing of specialty glass. Our finely ground glass powders are used in a broad variety of challenging technical applications. With a workforce of 15,400 employees in 35 countries, SCHOTT maintains close proximity to our customers worldwide.

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