

AERODISP® High-quality fumed alumina dispersions for Li-ion battery separator coatings

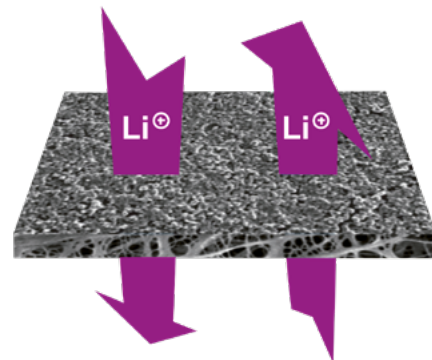


State-of-the-art lithium-ion batteries require a separator between the anode and cathode that not only prevents a short circuit but also allows Li-ions to flow through.

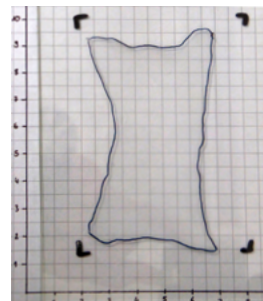
Shifts in temperature can reduce the safety performance of the microporous, polymer-based separator, which could cause a short circuit and risk electrolyte inflammation.

A thin ceramic separator coating made of AEROXIDE® fumed alumina reduces the thermal shrinkage and increases cell safety.

AERODISP® - our fumed alumina dispersions enable the preparation of ultra-thin ($\leq 1 \mu\text{m}$), homogeneous ceramic coatings, which is not possible using conventional coarser particles.

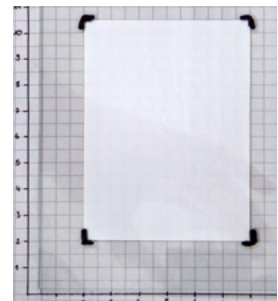


150 °C:
uncoated separator



Thermal shrinkage of membrane
→ risk of short-circuit!

150 °C:
AEROXIDE® coated separator



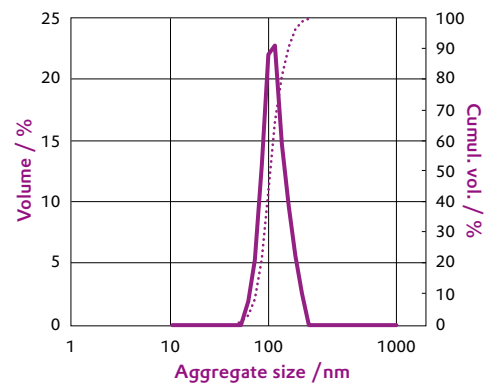
AEROXIDE® 



Evonik offers commercial AERODISP® and experimental VP Disp. dispersion products* for the preparation of reliable separator coatings. High-quality AEROXIDE® fumed alumina powders and many years of expertise in dispersion chemistry means you can expect:

- **stable, highly filled fumed alumina dispersions (up to 50 wt%),**
- **uniform and small particle size distribution (< 300 nm) and low viscosity for easy processing**

*) Developmental products are labeled with the VP designation. Their commercialization depends on market response. Even though they may be produced in commercial quantities, future availability should be verified. In some cases, these products may not have undergone complete testing



Particle size distribution of dispersed AEROXIDE® in water

Recommended fumed alumina dispersions for separator coating application

Product name	Solid Content [wt%]	Particle System	Surface Charge	pH value
AERODISP® W 440	40	AEROXIDE® Alu 65	positive	3.0 - 5.0
VP Disp. W 4150	50	fumed alumina with lower surface area	positive	3.0 - 5.0
AERODISP® W 450 ZX	50	AEROXIDE® Alu 65	negative	6.0 - 9.0
VP Disp. W 450 XC6	50	AEROXIDE® Alu 65	negative	8.0 - 10.0
VP Disp. W 4150 XC6	50	fumed alumina with lower surface area	negative	8.0 - 10.0

Typical values, no specification.

If you have questions about the differences between grades or separator coating application, contact Evonik's experts. Our dispersions can be specifically designed to meet your requirements.

This information and any recommendations, technical or otherwise, are presented in good faith and believed to be correct as of the date prepared. Recipients of this information and recommendations must make their own determination as to its suitability for their purposes. In no event shall Evonik assume liability for damages or losses of any kind or nature that result from the use of or reliance upon this information and recommendations. EVONIK EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, AS TO THE ACCURACY, COMPLETENESS, NON-INFRINGEMENT, MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE (EVEN IF EVONIK IS AWARE OF SUCH PURPOSE) WITH RESPECT TO ANY INFORMATION AND RECOMMENDATIONS PROVIDED. Reference to any trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used. Evonik reserves the right to make any changes to the information and/or recommendations at any time, without prior or subsequent notice.

AERODISP® and **AEROXIDE®** are registered trademarks of EVONIK INDUSTRIES AG or its subsidiaries.

Evonik Operations GmbH
Silica business line
Rodenbacher Chaussee 4
63457 Hanau
Germany

Phone +49 6181 59-12532
Fax +49 6181 59-712532
ask-si@evonik.com
www.silica-specialist.com

The Silica specialists at Evonik - Inside to get it right.