

METAL OXIDES ENHANCE PERFORMANCE, SAFETY AND LIFETIME OF LI-ION BATTERIES

AEROXIDE® 

HIGH-PERFORMANCE BATTERIES BOOST ELECTRIC MOBILITY

The global shift to electric mobility has the potential to reduce CO₂ emissions and air pollution from road traffic, as combustion engines are increasingly replaced by battery electric vehicles charged with renewable electricity. Batteries that are powerful yet safe, with quicker charging times and extended driving ranges, are essential for the acceptance of electric vehicles. But their high energy density puts increased strain on the battery materials and demands better technological development.

AEROXIDE® MAKES LI-ION BATTERIES LAST LONGER

High-quality metal oxides from Evonik are used as additives in Li-ion batteries (LIB) to increase their performance, service life and safety. AEROXIDE® fumed alumina and fumed titania are produced by flame hydrolysis, and consist of nanostructured aggregates with mean aggregate sizes of approx. 100 nm. The white powder provides a very narrow particle size distribution and exhibits high chemical purity. As dry coating on the surface of cathode materials, AEROXIDE® acts as a defined cathode electrolyte interface (CEI). It prevents undesired reactions and makes batteries last longer.

Lithium-Ion Batteries

Dry coating of cathode active materials with AEROXIDE® alumina can increase the service life of a Li-ion battery by around 50%.

Used as ultra-thin ceramic separator coating, AEROXIDE® improves thermal stability and contributes to battery safety.

Specific laboratory tests suggest that dry coating of cathode active materials with AEROXIDE® alumina increases the service life of a Li-ion battery by approximately 50%, resulting in carbon dioxide savings of ~10 metric tons CO₂ per kg of AEROXIDE. This reduces the need for new batteries, thereby avoiding the CO₂ emissions associated with battery production. If all EV cars use batteries with AEROXIDE® by 2030, around 78,000 kt of CO₂ could be saved – according to specific scenario assumptions.*

AEROXIDE® MAKES LI-ION BATTERIES SAFER

In Li-ion battery cells, AEROXIDE® fumed alumina can be used either as a ceramic coating on top of the polymer separator or as additives inside the separator to increase thermal stability.

A very thin layer of AEROXIDE® limits shrinkage of the membrane at higher temperatures. This helps to prevent thermal runaway and improves the safety standards of Lithium-ion battery cells.

APPLICATIONS OF AEROXIDE® IN LI-ION BATTERIES

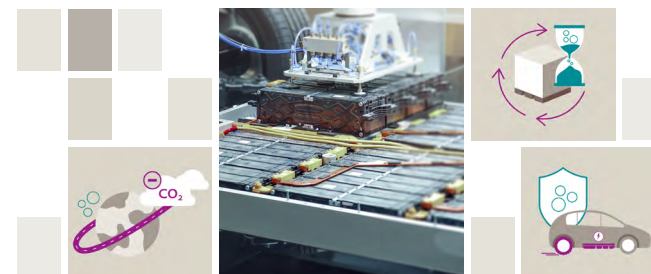
- Protective dry coating for cathode and anode materials
- High-performance LIB separator coating
- Nanostructured ceramic fillers inside separators
- Additive for electrolyte immobilization (gel polymer type)

Evonik provides comprehensive life cycle assessment (LCA) for AEROXIDE® products.

* Based on global EV car market in 2030, assuming 2.850 GWh and CO₂ emissions of 5,5t for production of a 100 kWh EV car battery. Sources: Avicenne Energy, 2025 and P3, 2025. Actual savings depend on various factors, including battery usage patterns, recycling rates, and the energy mix used for battery production.

The Silica and Silanes experts at Evonik – From elements to excellence.

AEROXIDE® 



Evonik Operations GmbH
Smart Effects business line
Rodenbacher Chaussee 4
63457 Hanau, Germany
ask-se@evonik.com
www.evonik.com



[evonik.click/
smarteffects-batteries](https://evonik.click/smarteffects-batteries)

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. AEROXIDE® is a registered trademark of Evonik Industries or its subsidiaries.