Alumina Systems to define the technology landscape for stationary solid-state batteries

Redwitz a.d. Rodach, Germany.

Batteries are a crucial part of our everyday lives and our economies.

Compared to the lithium-ion battery industry, the landscape of stationary solid-state batteries is fundamentally different. Solid-state batteries, based on Sodium Metal Chloride (SMC) as cathode materials, are Industrial Batteries used for stationary energy storage and uninterruptible power supply systems (UPS).

Europe is the technology leader for these SMC batteries, originally introduced as the ZEBRA battery. Swiss and German battery manufacturers together with their R&D labs for Ceramic Technologies have defined the industry's benchmarks since years.

Alumina Systems with its CeraSalt® branded technology stands out with a new generation of ceramic solid-state electrolytes, cells and cell components. After years of joint R&D work with selected industry partners, Alumina Systems started to produce the first components to supply battery system integrators and manufacturers in Europe and overseas.

Alumina Systems and its CeraSalt® components have defined the industry platform to efficiently manufacture the required high-technology ceramics and cell components. The development and manufacturing platforms are based on proprietary technologies and have been implemented at established industrial operations of a former Siemens Business Unit in Redwitz (Upper Franconia, Germany). All production processes have been developed and ramped up for industrial series production. The first production line is designed to produce cells with 100 MWh p.a. of capacity, after the installation of its automation equipment.

The production train is engineered for upcoming expansion steps. For the next expansion stage adjacent, former Siemens premises have been reserved for a cell manufacturing capacity of 1 GWh p.a..

All manufacturing processes and components have been reengineered and redesigned to produce the latest cell generation (Gen4), with tested performance features like an outer-ring cathode, a flat bottom and additional cell capacity for long duration storage. Gen4 is a major technological breakthrough, whereas the global competitors are almost exclusively focused onto Gen2 cells based on inner cathodes, often developed for short stroke cycling instead of dimensioning the cells for optimal capacity utilization.

Alumina Systems made key strategic decisions and investments during the past decade, that enabled it to pull ahead in SMC batteries for stationary applications. CeraSalt® profits from purpose-designed geometries for optimal discharge yield and from full capacity utilization, achieving 100% depth of discharge (DoD). Its ceramics and temperature flow profiles are designed to minimize thermal stress and thermal losses. The thermal management of CeraSalt® is perfectly balanced at cell and module level to offer long duration energy storage capacity.

CeraSalt® batteries can be deployed at any indoor or outdoor location, including dense urban environments, above and underground without imposing any thermal hazards. This is a substantial advantage over lithium-ion chemistries and their risks related to self-incineration.

The lukewarm surface of CeraSalt® batteries results from its unique thermal properties and allows for residential and industrial applications in any room, factory, logistics centre and bus station.

Additionally, special purpose HyHeat® industrial batteries by CeraSalt® have been engineered for the integration in steam generators and to SOEC systems for hydrogen electrolysis.

Due to its legacy ceramics operations and customer portfolio, Alumina Systems benefits from substantial economies of scale and of scope, while entering the market for solid-state batteries. That is, how Alumina Systems became the engine of innovation in its industry in many dimensions, from cell geometries to high efficiency discharging protocols and to manufacturing quality advancements.

Its cell and battery chemistry do not rely on any critical components, metals or minerals from supply chains outside of Europe. Active and passive battery materials are sourced in Europe or North America, avoiding typical supply risks. Providing Europe and the US with an alternative battery supply for stationary applications in today's world, where nearly all battery storage systems for power grids and microgrids rely on lithium- or sodium-ion cells, mainly produced outside Europe. CeraSalt® uses purified rock salt from Swiss mines, carbonyl nickel from Wales, iron powders and steel products from Germany and Sweden. All of its equipment suppliers, development and engineering partners are located in Europe.

The deep battery expertise of CeraSalt® helps Europe and America to avoid the mismatch of their production capabilities and the rising need for stationary batteries in the growing sectors of their economies. Especially in those sectors, which are mission-critical to the success of nations, ranging from terrestrial infrastructure for satellite communications to AI data centres, to storage of renewable energy for charging of mining equipment, trucks and boats, and to backup power in military signalling.

For these demanding applications, often under challenging ambient conditions, CeraSalt® provides an unmatched solution for industrial batteries to achieve resilience and an accelerated transformation to sustainable energy sources.

For contacts: **ksauerzapfe@alumina.systems**