ASTRABAT

STATUS OF THE ASTRABAT CELL AND PROSPECTS OF THE SOLID-STATE BATTERIES MARKET

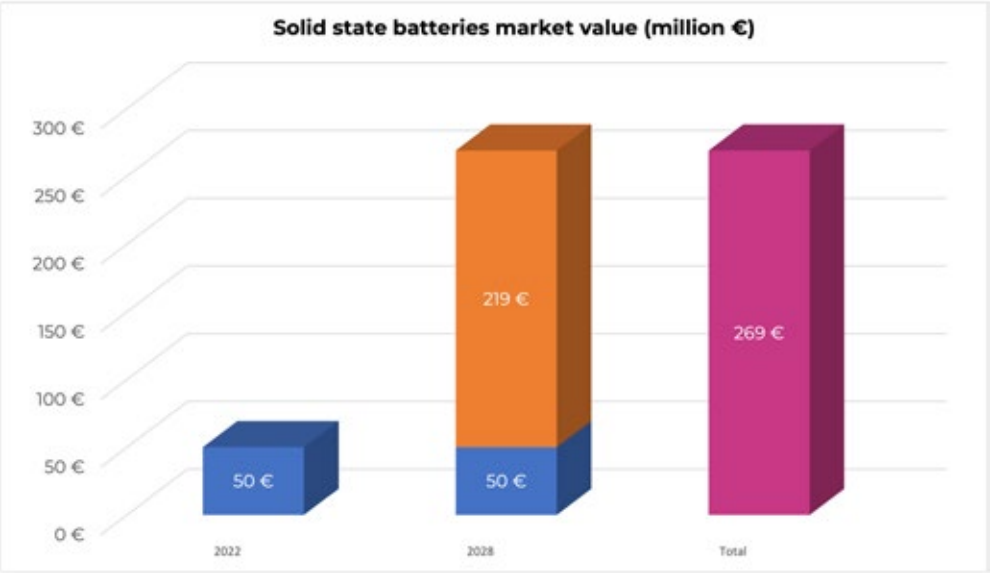
The info pack provides a status update on the manufacturability of the ASTRABAT cell which has emerged as the first pouch cell prototype in 2022. The ASTRABAT cell, designed with high-energy electrode materials and developed within a European network of experts and engineers, is reviewed in relation to the current state-of-the-art Li-ion cells.

Manufacturability assessment of the ASTRABAT cell vs. the production of a conventional lithium-ion cell

Three process steps can be identified in the production chain of a lithium-ion cell, whether it contains a solid or a liquid electrolyte: the electrode production, the cell assembly, and the final cell packaging and cell testing. How to upscale the solid electrolytes and electrodes used in the ASTRABAT project is still under investigation. What is clear is that those materials require dry rooms to be processed. Extrusion-based methods followed by slot die coating processes could potentially present a viable option when considering a roll-to-roll process. In the ideal case, some of the production processes for solid-state cells will be carried out on equipment already existing for the production of conventional lithium-ion cells. For cell assembly, packaging and also testing, the current infrastructure used for the production of conventional lithium-ion cells could likely be adapted to the requirements for the production of solid-state cells. It is expected that the formation cycle will be shorter and no degassing of the cells will be required, which could then also reduce the production cost.

Competitivity of European Li-ion cell manufacturers in the EV market

The cost per kWh, the cell performance and the most environmentally-friendly production process are important parameters for competiting in the EV market. Producing Li-ion cells at a GWh scale at low cost in Europe is a real challenge given that Asian manufacturers are years ahead. Therefore, developing the know-how to produce next-generation cells such as solid-state cells in Europe is a vital step for the European automotive sector. Scaling-up is an endeavour associated with financial risks. Going from a successful research solid-state cell prototype to large-scale production requires planning the production processes and costs which will determine the competitiveness of the product on the market. To de-risk financially the upscaling of a cell manufacturing chain, the right machine manufacturers need to be chosen as the capital investments are huge to meet the growing cell demand in Europe.



Exchange rate: April 2023

Market insights

The global size of the solid-state battery market is expected to experience substantial growth in the upcoming years. It is estimated that the market will expand from €50 million in 2022 to €269 million by 2028, representing a compound annual growth rate (CAGR) of 32.5% during the period[1]. The need for cells with improved performance (higher energy density, longer cycle life, better safety, etc.) as well as with a lower cost and a lower CO_2 footprint, are pushing investments towards the development of innovative cell chemistries, such as solid-state cells.

Time for market for the ASTRABAT cell

We believe 2030 could be a realistic goal to see large scale production of solid-state batteries. Currently, fundamental research is still needed to solve interfacial issues and mechanical stability of these solid-state cells before addressing the series production. We will most likely first see the ASTRABAT type of cells in niche markets before they will be mass produced for the EV markets where low cost is a crucial factor. The power performance is also a very important aspect for the final customer.

1 https://www.globenewswire.com/news-release/2022/02/22/2389057/0/en/Global-Solid-state-Battery-Market-Report-2022-Ongoing-Miniaturization-of-Electronic-Devices.html

Outlook

The ASTRABAT solid-state cell offers promising cell properties. Nevertheless, to mass produce such ASTRABAT cells, the appropriate commercial tools need to be carefully selected. Most of the production processes are not yet upscaled as the solid-state cell technology is still in a rather early stage of development. Producing solid-state batteries in series is a well-known challenge. Therefore, the ASTRABAT project partners will continue innovating with the hope to demonstrate the competitivity of the ASTRABAT cell with standard lithium-ion cells.

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