

Solid-state battery as an ultimate milestone in the companies' roadmaps ¹

2025 will be a decisive year for commercialization.

OUTLINE:

- Market forecasts:
The first volume applications are expected in the field of e-mobility.
The solid-state battery commercialization will start in 2025 to reach about 2.36 GWh in 2027.
- Technology trends:
There is no clear winner in solid-state battery technology regarding the electrolyte type, cell design, and manufacturing process.
There are multiple technology approaches available in the industry.
- Supply chain:
EV² makers remain the key driving force for solid-state batteries.
The overall supply chain of solid-state battery is influenced by their requirements.
Many Asian battery manufacturers and automotive OEM³s such as Samsung SDI, CATL, LG Energy, Toyota, and Hyundai have made large-scale investments in developing this technology.

*“Over the last few years we have seen a growing number of research activities in solid-state batteries.” asserts **Milan Rosina, PhD, Principal Analyst, Power Electronics & Batteries at Yole Développement (Yole)**. “However, the development of solid-state battery is still nascent. Many solid-state battery developers are planning to commercialize their batteries by 2025, which will undoubtedly be an important milestone for solid-state battery commercialization”.*

¹ Extracted from: [Solid-State Battery 2021 report](#), Yole Développement

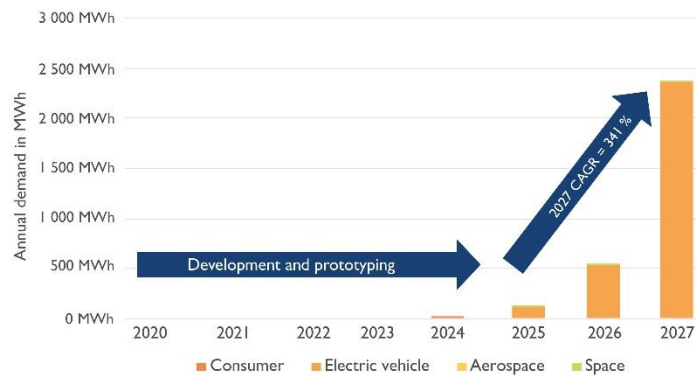
² EV: Electric Vehicle

³ OEM: Original Equipment Manufacturer

Based on the roadmaps of EV makers, technology achievements and supply chain collaborations as of Q1/2021, Yole expects that commercial introduction of solid-state batteries will start in 2025, with mass production of solid-state-battery-equipped vehicles starting around 2030. Solid-state battery demand will represent less than 2.5 GWh in 2027, a tiny volume compared to total Li-ion battery demand in 2027. Thus, no high-volume “switch” from conventional Li-ion to solid-state battery is expected. More than 99% of solid-state battery demand will be for EVs.

2020 - 2027 solid-state battery forecast in MWh, for electric vehicles, space, aerospace and consumer applications

(Source: Solid-State Battery 2021 report, Yole Développement, 2021)



© 2021 | www.yole.fr – www.micronews.com

In this context, Yole investigates disruptive technologies and related markets in depth, to point out the latest innovations and underline the business opportunities.

Released today, the Solid-State Battery 2021 report offers in-depth insight into the key drivers and value propositions of solid-state battery technologies, and comparisons with conventional Li-ion batteries. It also provides an analysis of the remaining challenges in bringing solid-state batteries to commercialization with a dedicated focus on different applications. Including market trends and forecasts, supply chain, technology trends, technical insights and analysis, take away and outlook, this study also delivers an in-depth understanding of the ecosystem and main players’ strategies.

What are the economic and technological challenges of the solid-state battery industry? What are the key drivers? Who are the suppliers to watch, and what innovative technologies are they working on? What are the different approaches for the solid-state battery commercialization?

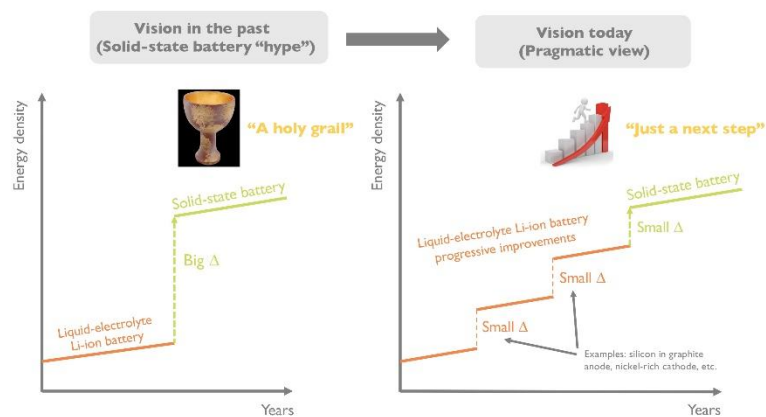
Yole presents today its vision of the solid-state battery industry.

As analyzed by Yole’s team in the new Solid-State Battery 2021 report, solid-state battery is considered an ultimate milestone in the technology roadmaps of battery and EV makers. A few years ago, such batteries were considered by many companies as a “holy grail” to target, one that could revolutionize the battery and electric vehicle industry. Many EV

makers have since bet on solid-state battery start-ups either because of their optimism in view of rapid achievement of commercial products or to ensure they do not miss the train in the growing battery competition. The magic word “solid-state battery” has also provided entry to additional R&D funding from venture capital funds and public funds, thus reducing the amount of investment required from EV makers themselves.

How solid-state battery vision evolved

(Source: Solid-State Battery 2021 report, Yole Développement, 2021)



According to **Shalu Agarwal, PhD, Technology & Market Analyst, Power Electronics & Materials at Yole**: “The vision held for solid-state battery has evolved and is more pragmatic today. Solid-state battery is currently considered as just an additional step in the progressive step-by-step improvement of conventional Li-ion batteries”.

Indeed, most battery and EV makers are refocusing their efforts on shorter-term technology milestones such as nickel-rich cathode (NCM811), silicon-graphite anode, and cobalt-free cathode.

“Bringing solid-state technology to mass production is a difficult task and needs more time than was previously expected.” says **Milan Rosina**. “It is clear now that partnerships are more important than ever to bring all the necessary solid-state battery know-how together: technology, equipment, high-volume / high-yield production, and end-systems”.

Partners with know-how in ceramic material and ceramic-based devices, and with experience in lithium-metal anode and electrode / electrolyte interfaces, may be immensely helpful in shortening the time needed to bring the solid-state battery to market.

All year long, *Yole Développement* publishes numerous battery-related reports and monitors. In addition, experts realize various key presentations and organize key conferences.

Make sure to be aware of the latest news coming from the industry and get an overview of our activities, including interviews with leading companies and more on *i-Micronews*. Stay tuned!

Press contacts



Press Release

Sandrine Leroy, Director, Public Relations, leroy@yole.fr

Marion Barrier, Assistant, Public Relations, marion.barrier@yole.fr

Le Quartz, 75 Cours Emile Zola – 69100 Villeurbanne – Lyon – France – +33472830189

www.yole.fr - www.i-micronews.com– [LinkedIn](#) – [Twitter](#)

About our analysts

Milan Rosina, PhD, is Principal Analyst, Power Electronics and Batteries, at Yole Développement (Yole), within the Power & Wireless division. He is engaged in the development of the market, technology and strategic analyses dedicated to innovative materials, devices and systems. His main areas of interest are EV/HEV, renewable energy, power electronic packaging and batteries. Milan has 20 years of scientific, industrial and managerial experience involving equipment and process development, due diligence, technology and market surveys in the fields of renewable energies, EV/HEV, energy storage, batteries, power electronics, thermal management, and innovative materials and devices. He received his PhD degree from Grenoble Institute of Technology (Grenoble INP) in France. Milan Rosina previously worked for the Institute of Electrical Engineering in Slovakia, Centrotherm in Germany, Fraunhofer IWS in Germany, CEA LETI in France, and utility company ENGIE in France.

Shalu Agarwal, PhD, is Power Electronics and Materials Analyst at Yole Développement (Yole), within the Power & Wireless division. Based on Seoul, Shalu is engaged in the development of technology & market reports as well as the production of custom consulting studies. Shalu has more than 10 years' experience in Electronic Material Chemistry. Before joining Yole, she worked as a project manager and research professor in the field of electronic materials, batteries and inorganic chemistry. Shalu Agarwal received her master's and Ph.D. degree in Chemistry from the Indian Institute of Technology (IIT) Roorkee (India).

About the report

Solid-State Battery 2021

Solid-state battery as an ultimate milestone in the companies' battery roadmaps. – Performed by Yole Développement

Companies cited:

Asahi Kasei, AdaVolt, Ampcera, Audi, Blue Solutions, BASF, Beijing Shenzhou Judain New Energy, BMW, BYD, Bolloré, Bosch, BrightVolt, CATL, CEA, Daimler, Dongshi Kingpower Science and Technology Ltd, Fujian Super Power New Energy Co., Ford, Fisker, GM Motors, GS Yuasa, Ganfeng Lithium, Hitachi Zosen, Hydro Québec, Honda, Hyundai, Idemitsu Kosan, Ilika, IMEC, Ionic Materials, Johnson Battery Technologies, Japan Aerospace Exploration Agency (JAXA), Kokam, Kalptree, Kuraray, KIA, LG Energy Solution, Leclanche, Lionano, Mitsubishi Motors, Manz, Mitsui Kinzoku, Murata, and more...

Related reports:

- [DC Charging for Plug-In Electric Vehicles](#)
- [Power Electronics for E-mobility 2021](#)
- [Li-ion Battery Packs for Automotive and Stationary Storage Applications](#)
- [Lithium-ion Battery Recycling Market & Technology Trends 2020](#)
- [Status of the Rechargeable Li-ion Battery Industry](#)

About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

For more information and images, please visit our website [i-Micronews](#)

###