

Solid State Battery Market - Global Industry Size, Share, Trends, Opportunities, and Forecast 2018-2028.Segmented By Type (Thin Film, Portable, Bulk), Capacity (Less than 20mAh, Between 20-500mAh, 500mAh & Above), Application (Consumer & Portable Electronics, Electric Vehicle, Energy Harvesting, Wearable & Medical Devices, Others), Region and Competition

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Abstracts

Global Solid State Battery Market is expected to witness significant growth during the forecast period due to the rising demand for solid-state batteries among the end-use sectors and the increase in R&D activities, aimed at commercializing the cost of batteries, are projected to propel the market over the forecast period. The increasing uptake of electronic gadgets, the rising utility of battery energy storage systems, and the augmenting deployment of electric vehicles are the key factors driving the market.

Solid state batteries are based on a technology that uses solid electrodes and solid electrolytes as an alternative to liquid or polymer electrolytes found in lithium-ion or lithium-polymer batteries. This technology serves as one of the leading alternatives to conventional lithium-ion battery technology. Solid state batteries have found their application in radio-frequency identification (RFID), pacemakers, and wearable devices. Its smaller, lighter solid-state batteries are expected to be a breakthrough for the electric vehicle industry.

Electric cars and wearable technology require improved batteries as compared to current lithium-ion battery technology, as lithium-ion batteries are sensitive to high

temperatures and have safety concerns related to exploding when overcharged and discharged. Solid state batteries are proved to be one of the leading alternatives of lithium-ion battery technology, as they are safe due to the presence of a solid electrolyte, which prevents leakage. In addition, they have longer life spans and can be used for thinner devices.

Several industry giants are planning to invest in solid state batteries. For instance, in 2017, Toyota planned to have solid state batteries in electric cars. Moreover, the increase in the application of solid state batteries in the healthcare, wearable, and the drone sectors is one of the major factors responsible for the growth of the global solid state battery market. In addition, the surge in the need for solid state batteries in electric vehicles plays a key role in escalating the market growth. However, the complex manufacturing process and high cost of solid state batteries restrain the market growth.

Global Solid State Battery Market: Drivers & Trends

Increase in Demand for Fast Charging Technology in Electric Vehicles

Lithium (Li) is a component of both solid-state and lithium-ion batteries. In both batteries, negatively charged electrons can travel along the circuit because Li^+ ions migrate from one area of the battery to another. Solid-state batteries employ solid-state components, whereas conventional lithium-ion batteries use liquid electrolytes. Regular lithium batteries are less effective than solid state batteries. The benefits of lithium batteries include their high energy density. However, the technology has flawed such inadequate heat management and safety concerns. Solid state batteries are said to attain 80% charge in 12 minutes because they are more stable than their lithium-ion counterparts and can store up to 50% more energy. Battery technology companies have set up pilot-scale facilities to manufacture solid-state batteries. The current demand for higher energy and power densities, fast charging, and safety concerns promotes research and development in the battery industry. Solid state batteries are being developed by several battery manufacturers to enable quick charging in electric cars and to offer a large range. For instance, Quantum Scape published performance information for its all-solid-state battery technology in December 2020 based on the created prototype. It has more range than typical lithium-ion batteries and takes around 15 minutes to charge to 80%. Its operational temperature range is also larger. There is a lot of interest in rapid charging because of the exponential growth of electric vehicles. It is thus expected that these factors would encourage the growth of the global solid state battery market.

Increase in Application of Solid-State Batteries

In the fields of drones, wearable technology, and healthcare, solid state batteries are widely used. Their initial use was as the main power source for pacemakers, which included putting a sheet of Li metal in direct contact with solid iodine. A lithium-iodide layer (LiI) is created at their interface as a result of the interaction between the two materials, which behaves like a short-circuited cell. A very modest, steady current flows from the lithium anode to the iodine cathode once the layer has formed. The use of solid state batteries is also possible in wearable electronics, RFID, and pacemakers. In electric cars, solid-state batteries might also be utilized. Currently, nickel-metal hydride (NiMH), li-ion, lead-acid, and electric double-layer batteries are used in hybrid and plug-in electric vehicles. However, several automakers and other businesses are eager to create or utilize solid state batteries. Toyota and Panasonic established cooperation in 2017 that will involve working together on solid-state batteries. Nissan, Hyundai Motor Company, BMW, Honda, and other automakers intend to develop solid state battery technology. Solid state battery manufacture has begun at a facility that has been installed in Kunshan, East China, by the Chinese business Qing Tao. According to the Chinese press, the production line can now produce 100 MWh annually, but it is expected to reach 700 MWh by 2020.

Increase in R&D Investments

The solid state battery industry is predicted to see an increase in investment, which will present profitable chances for market growth. Industry Giants like Samsung and Hyundai are making significant investments in the creation of improved, future-proof solid state batteries. For instance, A123 Systems, Hyundai, Sanoh Industrial, and Samsung Venture Investment have invested USD 20 million in the solid state battery start-up Solid Power, based in Louisville, Colorado. To grow the car battery industry, Solid Power and BMW formed cooperation in 2017. According to the business, their battery technology gives significantly more energy than traditional lithium-ion batteries while also lowering system-level expenses for safety measures. Furthermore, Volkswagen announced a USD 100 million investment in the battery technology firm Quantum Scape. Through investment, the two companies merged to form a joint venture to bring solid state battery technology to market at scale by 2025.

Global Solid State Battery Market: Restraints

Availability Of Low-cost Substitutes

Applications that need lightweight and high-energy-density batteries employ lithium-ion technology. These batteries, which are mostly utilized in hybrid cars, laptop computers, and cell phones, offer the maximum energy density per weight. Large energy density and large capacity are both features of lithium-ion batteries. These batteries have good load characteristics. Compared to other battery types, lithium-ion batteries have the benefit of requiring less maintenance. Since there is no memory, the battery's life cannot be extended by planned cycles. Furthermore, these batteries have less self-discharging, which makes them suitable for a variety of applications where it is necessary to hold a battery charge for a longer amount of time. When disposed of properly, lithium-ion batteries are less damaging to the environment. Additionally, its benefits, including a straightforward production method, reliability, durability, minimal maintenance costs, and a high discharge rate capacity, are anticipated to boost demand. Due to its fragility and the need for a protective circuit to ensure safe operations, lithium-ion batteries do have certain restrictions. The majority of lithium-ion batteries have an aging problem that causes capacity loss after a year regardless of whether the battery is being used or not.

In the near future, it is anticipated that the availability of numerous batteries in a range of sizes and specifications combined with a high current level will increase demand. In comparison to other batteries, lead-acid batteries are significantly less expensive, and they are also simple to make using relatively low-tech machinery. The growth of the worldwide solid state battery market is thus anticipated to be constrained in the near future. The market for solid-state batteries is anticipated to be significantly constrained by the declining cost of lithium-ion batteries as a result of the expansion of production facilities by Samsung, LG Chem, Tesla, BYD, BAK Battery, Guoxuan, Shandong Win battery, and Zhejiang Tianneng in China. The demand for solid state batteries is predicted to decline in the coming years as a result of significant technological advancements in lithium-ion batteries, including the electrolytes, modifications to the silicon anode material that dramatically increase voltage capacity, and the Li-S & Li-air technologies with high energy density.

Industry Challenges

Lead oxide, sulfuric acid, and polypropylene are the key raw materials that are used in the manufacturing of batteries. Polypropylene, which is used to make cases for batteries, is derived from carbon compounds and petroleum. Crude oil and natural gas derivatives are the primary feedstock that is used to produce polypropylene; therefore, fluctuation in the prices of crude oil and natural gas plays a key role in the cost dynamics of plastics used for battery manufacturing. Crude oil witnessed tremendous

fluctuation in prices over the past few years owing to the large supply-demand gap. Several nations implemented policies to stock up on crude oil to maintain a constant supply to their population. At the same time, fossil fuel deposits could not yield enough output to meet the ever-rising global demand for oil. However, technological advancements in the oil & gas sector have resulted in increased crude oil output, thereby reducing the supply-demand gap, and consequently reducing the prices of crude oil.

The price volatility of crude oil directly affects the production of downstream derivative goods. Lithium-ion batteries are projected to be utilized in more electric vehicles, portable devices, and energy storage systems due to their rising energy densities and low maintenance needs. Compact cylindrical lithium-ion batteries are ideal for use in consumer electronics, such as laptops, while large cylindrical cells are fantastic for use in electric vehicles. Pouch-style batteries are often used in cell phones. Prismatic lithium-ion batteries, which feature a semi-hard plastic casing, are used in automotive applications. Due to new technologies, lithium iron phosphate batteries are growing in popularity. For instance, in addition to electric cars and power generation, the development of lithium iron nano phosphate batteries has found considerable use in the telecommunications industry. These qualities are projected to pose a threat to the market expansion for solid state batteries in the near future due to the benefits of other battery types that have already been stated.

Market Segments

The global solid state battery market is segmented by type, capacity, application, and region. Based on type, the market is segmented into thin film, portable, and bulk. Based on capacity, the market is segmented into less than 20mAh, Between 20-500mAh, and 500mAh & above. Based on application, the market is segmented into consumer & portable electronics, electric vehicles, energy harvesting, wearable & medical devices, and others. Based on region, the market is segmented into North America, Asia-Pacific, Europe, South America, and the Middle East & Africa.

Market Players

Major market players in the global solid state battery market are Cymbet Corporation, Seo Inc., Toyota Motor Corporation, Sakti3 Inc., BrightVolt Inc., Excellatron Solid State LLC, Infinite Power Solutions, Inc., Planar Energy Devices Inc., Altair Nanotechnologies Inc., and Solid Power Inc.

Report Scope:

In this report, the global solid state battery market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Solid State Battery Market, By Product Type:

Thin Film

Portable

Bulk

Solid State Battery Market, By Capacity:

Less than 20mAh

Between 20-500mAh

500mAh & Above

Solid State Battery Market, By Application:

Consumer & Portable Electronics

Electric Vehicle

Energy Harvesting

Wearable & Medical Devices

Others

Solid State Battery Market, By Region:

Asia-Pacific

China

India

Japan

South Korea

Australia

North America

United States

Canada

Mexico

Europe

France

Germany

United Kingdom

Italy

Spain

Middle East & Africa

South Africa

Saudi Arabia

UAE

South America

Brazil

Argentina

Colombia

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the global solid state battery market.

Available Customizations:

The global solid state battery market with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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