

News Release

FOR IMMEDIATE RELEASE

Development of 48V Lithium-ion Battery Pack with Improved Output Density and Energy Density Developed for Mild Hybrid Vehicles

Tokyo, May 22, 2017 ---Hitachi Automotive Systems, Ltd. has developed a 48V Lithium-ion battery pack for mild hybrid vehicles with an increased output density of 1.25 times the existing level^{*1}, and an increased energy density of 1.5 times the existing level^{*1}. Samples will begin to be provided to automobile manufacturers, and mass production will commence from fiscal 2019.

In recent years, mild hybrid systems that utilize batteries and motors to assist a gasoline engine have been gaining attention as a technology for improving fuel consumption. The production of mild hybrid vehicles is forecast to increase from 450,000 units in 2016 to over 12.8 million units in 2023^{*2}. Especially in Europe and China, mild hybrid systems using 48V lithium-ion batteries are expected to spread rapidly, providing improved fuel consumption at comparatively low cost.

Based on this trend, in March 2016, Hitachi Automotive Systems developed a 48V Lithium-ion battery pack for mild hybrid vehicles, combining the company's battery management system (BMS) technology with its existing strengths in lithium-ion cell manufacturing technology for hybrid vehicles.

Batteries are charged and discharged by lithium ions leaving and entering the electrode material. Until now, increasing the output density of a battery was generally accomplished by making a thinner membrane on the cell electrode, thus reducing resistance. However, in return for the increased output density, the amount of energy that could be stored was reduced. For the new lithium-ion battery, resistance was reduced and output density was increased without making it thinner by modifying the cell electrode on a microscopic level to provide a structure that facilitates the flow of lithium ions. Furthermore, energy density has been increased by improving the material composition of the positive and negative electrodes and increasing the amount of lithium that can be stored per unit of weight. This made it possible to achieve an output density of 1.25 times the existing level^{*1} and an energy density of 1.5 times the existing level^{*2}.

In addition to a lower internal resistance within the battery cells and reduced heat emissions, a thermally-conductive and exoergic metal is used in the body of the

lithium-ion battery pack that eliminates the need for a cooling fan. This enables the production of thinner batteries, provides greater freedom in installation, and reduces noise.

Improving output density makes it possible to increase the motor's torque performance for assisting acceleration, providing maximum torque upwards of 12kW and enabling powerful driving when accelerating from a standstill. Furthermore, it realizes a maximum input of 15kW or more, enabling the recovery of the substantial recycled energy that is instantly produced when decelerating, and reducing energy loss. In addition to such improvements in input and output characteristics, fuel consumption is improved due to the increased energy density.

The product will be developed and sold by Hitachi Automotive Systems, and manufactured by Hitachi Vehicle Energy, Ltd., a manufacturer of automotive lithium-ion batteries.

The product will also be on display at the Automotive Engineering Exposition 2017 Yokohama hosted by the Society of Automotive Engineers of Japan at Pacifico Yokohama from Wed. May 24 until Fri., May 26.

Hitachi Automotive Systems will continue to help develop and promote electric vehicles and contribute to the conservation of the environment through the provision of electric power train products such as highly reliable and high-performance lithium-ion batteries for electric vehicles, for which the market is anticipated to grow.

*1 Comparison with 48V lithium-ion battery pack for mild hybrid vehicles developed in March 2016

*2 Source: IHS Automotive (May 2017)

■ The newly-developed 48V lithium-ion battery pack for mild hybrid vehicles



■ Specifications of the newly-developed 48V lithium-ion battery pack for mild hybrid vehicles

Item	Specifications
Dimensions (W x L x H)	175 x 300 x 90
Number of cells	12
Weight (kg)	8
Capacity (Ah)	8
Maximum input (kW) (10s, 50% SOC (State Of Charge), 25°C)	15
Maximum output (kW) (10s, 50% SOC (State Of Charge), 25°C)	12
Cooling method	Natural air cooling

About Hitachi Automotive Systems, Ltd.

Hitachi Automotive Systems, Ltd. is a wholly owned subsidiary of Hitachi, Ltd., headquartered in Tokyo, Japan. The company is engaged in the development, manufacture, sales and services of automotive components, transportation related components, industrial machines and systems, and offers a wide range of automotive systems including engine management systems, electric power train systems, drive control systems and car information systems. For more information, please visit the company's website at <http://www.hitachi-automotive.co.jp/en/>.

About Hitachi Vehicle Energy, Ltd

Hitachi Vehicle Energy, Ltd. is a subsidiary of Hitachi, Ltd., headquartered in Ibaraki Prefecture, Japan. The company manufactures lithium-ion batteries and is expanding the scale of mass production. For more information, please visit the company's website at <http://www.hitachi-ve.co.jp/en/>.

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