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ELIY Power Successful in Developing Lithium-ion Battery Using Nonflammable Ionic Liquid

Greater Safety/Patent Applied for Production Method Involved in this Technology

ELIY Power Co., Ltd. (Head Office: Shinagawa-ku, Tokyo, Japan; President: Hiroichi Yoshida) today announced that it has succeeded in developing lithium ion battery using an ionic nonflammable liquid as the electrolyte. The company has applied for a patent for the production method involved in this technology and aims to commence mass production of the battery in the first half of the 2020s.

Because ionic liquids are chemically stable and nonflammable, they are expected to be used as electrolytes of lithium batteries. However, it has conventionally been considered difficult to commercialize lithium-ion batteries using an ionic liquid because the viscosity of ion liquids is high. This makes it difficult to transport lithium ions at high speed, meaning that a sufficient electric charge and discharge performance cannot be obtained.

ELIY Power has increased the lithium ion transference number using a unique production method and succeeded in developing an ionic liquid type lithium ion battery capable of charging and discharging at the 1C rate^{*1}. In addition, in a life test conducted under a 23°C environment by repeating full charging and discharging, a capacity retention of 90% and more was achieved after 1,000 cycles, demonstrating that the ionic liquid type lithium ion battery has a life equivalent to the life of the company's existing batteries^{*2}.

With the introduction of renewable energy being promoted and social needs for rechargeable batteries as a backup power supply at the time of power failure consequently rising, electrolytes of presently prevailing common lithium-ion batteries are classified as Category IV Class II petroleum because flammable organic solvents are used. This regulation is applied to cases when the total amount of hazardous materials installed in a building and the electrolytes exceeds 200 L^{*3}, and has thus been a hurdle to the installation of large-capacity rechargeable battery equipment.

By substituting conventional organic electrolytes to ionic liquids, the regulation does not apply, and thus large-capacity rechargeable battery equipment would be more easily installed and stored. Moreover, the necessary capital investment for battery production plants would be suppressed.

As an electrolyte fireproofing technology, all-solid-state batteries using solid electrolytes exist, and although ELIY Power has been developing an all-solid-state battery concurrently with the development of lithium-ion batteries, it is convinced that the technology of ionic liquid type lithium-ion batteries will better contribute to satisfying the current social needs for rechargeable batteries in comparison to all-solid-state batteries, because existing production equipment and processes can be transferred to production of ionic liquid type lithium-ion batteries and because it is possible to achieve high energy density due to a broad array of materials used in the production of such lithium-ion batteries.

Since its establishment in 2006, ELIY Power has focused on the commercialization and proliferation of highly safe lithium-ion batteries.

Specifically, it has been consistently striving to secure the highest level of safety of lithium-ion batteries using organic electrolytes, by not using rare metals as materials for cathode and by using unique battery designs and production technologies to develop very safe large lithium-ion batteries capable of preventing the risk of smoking and catching fire, even if accidents such as internal shorting (forced shorting occurring at the time of nail penetration tests), crushing, and overcharging occur, with strict third-party safety certifications issued by international third-party testing and accreditation bodies TUV Rheinland Japan Ltd.*⁴, UL, Inc. *⁵, and Japan Fire and Disaster Management Agency*⁶ obtained.

Since 2010, ELIY Power has started production of 50 Ah-class large lithium-ion batteries with high safety and long life at our fully automated plant in Kawasaki City. The large lithium-ion battery has been incorporated in electricity storage systems for home, office, and industry uses developed by the company. In this manner, the company has sought to promote an energy storage society, with the accumulated number of shipped electricity storage system to date reaching 30,000 units.

Moving forward, ELIY Power will continue its efforts develop and promote the spread of lithium-ion batteries and electricity storage systems, based on its philosophy of popularizing systems that store energy and utilize stored energy, aspiring to resolve the world’s energy-related and environmental problems.

*1 1C: Charge and discharge current at the same rate as the rated capacity. Capable of charging and discharging by the rated capacity of the battery in about 1 hour.

*2 Large lithium-ion battery for stationary installation: 93% battery capacity retention rate at 1,000 cycles
80.1% battery capacity retention rate at 12,000 cycles

Lithium-ion battery for starting two-wheel vehicles: 90% battery capacity retention rate at 1,000 cycles

*This is an estimated service hour of the battery cell at room temperature (23°C), The capacity retention of the battery cells may change depending on the usage condition of the energy storage system (e.g. frequency of charging/discharging, operating environment, etc.).

The actual electrical capacity of the energy storage system may differ from the total electrical capacity of the battery cells built into the system because of the system usage condition.

*3 Category IV Class II petroleum are subjected to the regulations by the Fire Service Act of Japan if the above total amount exceeds 1,000 L and by the Fire Prevention Ordinances of Japan if the above total amount exceeds 200 L.

*4 Safety Standard Certification TUV-S mark (Manual of Lithium-ion Cell Test under Severe Conditions v.2: 2011)

*5 Safety Standard UL1642

*6 Secondary Battery Equipment Model Certification (Model Certification Nu.: 18C703)

“For Safe Life, For People and Society”

Since its establishment in 2006, EILLY Power Co., Ltd. Has carried out development of technologies and products with the highest priority on safety. Moving forward, ELIY Power will continue working to develop and promote the spread of lithium-ion batteries and electricity storage systems, based on its philosophy of popularizing systems that store energy and utilize stored energy, aspiring to resolve the world’s energy and environmental problems.

◆ For inquiries, contact

Public Relations Dept., ELIY Power Co., Ltd.

19th Floor, Shin-Osaki Kangyo Building (Osaki New City Building No. 4), 1-6-4 Osaki, Shinagawa-ku Tokyo, 141-0032 Japan

Phone: +81-(0)3-6431-9047 (Public Relations Dept. direct line)