

3 DOM has Developed Next Generation Rechargeable Batteries

Applications to Vessels – Achieves Reliability and High Energy Density

<Green x Shipping>

3DOM, a next generation battery venture from Japan, has recently developed next generation rechargeable batteries that can be used in vessels. There are two types of next generation batteries: a second generation lithium ion battery that maintains the energy density while reducing the risk of ignition and improving reliability; and a third generation lithium metal battery that significantly increases the energy density. Second generation batteries are scheduled to start mass production next year.

There are four priority issues in the battery industry for the spread of rechargeable batteries: improved reliability, lower cost, higher energy density, and longer life. In terms of reliability, battery-related fires have occurred all over the world, including a fire explosion in the battery room of an electric ferry in Norway last October. As such, improving reliability while maintaining energy density has become an important development theme in the battery industry.

3DOM has a proprietary technology of separator that separates battery's cathode and anode. The company is developing a highly reliable battery by using a substance called polyimide. To achieve higher energy density for the use of battery pack, the company tackles two approaches: Improvement of the energy density of the cells that are the basis of the battery, and improvement of cell occupancy rate in a battery pack (that decreases as a result of fire spreading preventive measures) by way of developing highly reliable battery. "The separator and the next generation batteries that we develop will be a promising solution. Although the issue we have now is a high cost, we believe that we will achieve higher reliability and energy density that can readily offset such cost," Executive Vice President Hiromichi Aoki says.

The company is developing next generation batteries that are the second to fourth generations of existing lithium ion rechargeable batteries. The 2nd generation is a lithium ion battery that maintains the energy density and cycle life while using a more heat-resistant material to improve reliability; the 3rd generation is a lithium metal battery, using lithium metal for the anode, that significantly increases the energy density and decreases cost; the

4th generation is a solid electrolyte battery that allows significant improvements in energy density and life cycle and lower cost. "All the next generation batteries under development can be used for vessels. The cruising range will increase dramatically from the 3rd generation." (EVP Aoki)

The company has successfully developed the 2nd and the 3rd generations of batteries. The 2nd generation batteries will start mass production next year and will be deployed for the industrial applications market. The prototype is already completed. It is a pouch cell of 30Ah class, and the company is considering to apply it on the products of LAVLE, an affiliate in the U.S. that handles electrification of vessels. In addition, the 3rd generation is a 400Wh/kg class lithium metal battery, and the company has started evaluation sample work for communications equipment and unmanned aerial vehicles. For the 4th generation, the company has also succeeded in developing a large sample cell.

"Because batteries have a risk of catching fire, it is usually necessary to have a battery room when installing them on vessels. In the future, highly reliable batteries will probably increase the degree of freedom in the design of vessels if the battery room becomes unnecessary." (EVP Aoki).