

3DOM

## Developed Energy Storage System

### Effective for Electrification of Vessels

An entrepreneurial venture company 3DOM (Yokohama) that develops next generation batteries for applications to vessels, etc., has announced that LAVLE, 3DOM's U.S. subsidiary, developed "Proteus", a flagship model of Energy Storage System (ESS) that uses lithium ion battery. Proteus has accomplished longer life cycle and higher reliability of the installed next generation battery cells than conventional products, and will become a promising tool for electrification of vessels. Business discussions have already started with cabotage vessels operators and vessel application component manufacturers. Within shortly, LAVLE will start simulating energy consumption of vessel operations.

Mr Hiromichi Aoki, Executive Vice President of 3DOM, indicated "Toward achieving the reduction target of greenhouse gas emission by International Maritime Organization, electrification of vessels is absolutely necessary. We have confidence in the reliability and performance of our batteries, and we strive for being in the mainstream of electrification of vessels."

Proteus has the size of a large household refrigerator and contains several modules, each of which is a group of cells that comprise the next generation battery. The numbers of cells and modules can be flexibly adjusted to satisfy the output requirements of customers.

As an example of electrification of vessels by using Proteus, the excess power of diesel generator can be stored and used for driving bow thruster and side thruster at the time of port arrivals.

Application of Proteus will lead to reduction of diesel fuel and maintenance cost through the reduction of diesel generator uptime, as the positive effects. Mr Aoki mentioned that "It is possible to operate a fully electrified vessel if the navigation distance is shorter and if the power charging can be done at the ports."



External Picture of "Proteus"

If the source of power supply is renewable energy such as solar or wind power, it is possible to operate vessels with no CO<sub>2</sub> emission.

In comparison with conventional ESS products, Proteus has excellent performance in various areas.

In the case of existing ESS, if there is even one deteriorated cell within a module, the overall performance of the module will be down. In the case of Proteus, healthy cells cover the deteriorated cells, thereby lengthening the period of time of good module performance.

Further, Proteus excels in scalability. Conventional ESS cannot change over to next generation battery cells, but Proteus can replace the cells with the next generation high energy density cells.

LAVLE is constructing a Proteus manufacturing plant in Washington State, U.S., and plans to start production from some time toward the end of this year. The first placement of orders has been achieved for the applications to shale gas and shale oil drilling rigs. Promising business talks are being conducted for applications in defense industry and railroads in addition to other vessels.

3DOM is an industry-academia entrepreneurial venture company working with Tokyo Metropolitan University. It was established in 2014 by individual investors. The current capital is JPY 6.61 billion (including capital reserve).

The lithium ion batteries provided by 3DOM are anticipated to be used for electric vehicles, drones, airplanes, housing, household electric appliances, etc. in addition to the application to vessels.