Sharp Achieves the World's Highest Power Density for Direct Methanol Fuel Cells

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Sharp Corp. has achieved the world's highest power density, 0.3W/cc, for direct methanol fuel cells (DMFC) for mobile equipment. This new technology enables efficient power generation from a small cell volume. The use of this technology can make it possible to develop fuel cells that have almost the same volume but a longer continuous-use lifespan than lithium-ion batteries, which are the main type currently in use.

Because fuel cells use energy produced by the chemical reaction between hydrogen and oxygen, they have a small impact on the global environment. Also, fuel cells are expected to become the next-generation power generating devices because of their high generating efficiency that comes from converting chemical energy directly into electrical energy.

In particular, DMFC have a simple structure in which power is generated through a chemical reaction between methanol supplied directly to the power generation part and oxygen in the air, making them suitable for miniaturization.

Therefore, since these fuel cells have great potential for future use in mobile equipment, active research and development on DMFC is intensifying all over the world. However, there are some problems that need to be solved, such as their low power density that increases the size of the power generation part and, as a result, increases the total cell volume.

Giving special attention to the power generation part's stack structure, Sharp has developed the three-dimensional highly integrated stack structure through the use of thin cells made by microfabrication. This structure can be created by the alternate lamination of reed-shaped thin cells arranged in parallel at fixed intervals and reed-shaped (porous) spacers, with the cells and spacers running perpendicular to each other like a grid.

With this structure, uniform and continuous spaces are secured, making it possible to increase the cell surface area per unit volume and smoothly circulate the air that is one of the sources for power generation. Thus, Sharp has improved power density per unit volume and achieved the world's highest level, 0.3W/cc (about 7 times greater than previous Sharp technology).

In the future, through continuing to pursue the development of this elemental technology, cell volume can be further miniaturized, and the creation of cells with the same volume but a longer lifespan than the currently mainstream lithium-ion batteries can be achieved. By further promoting this elemental technology in the future, Sharp will commit itself to the creation of small fuel cells with a long lifespan.

Source: Sharp

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