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## **SDK Develops Molded Carbon/Resin Separator for Fuel Cell**

Showa Denko K.K. (SDK) has developed a high-performance molded carbon/resin separator for polymer electrolyte fuel cell (PEFC) to be used as a power source for homes, cars and mobile devices. This development is part of the PEFC system project of the New Energy and Industrial Technology Development Organization (NEDO), which commissioned Mitsubishi Electric Corporation to carry out the project.

PEFC is a fuel cell that uses solid electrolyte, eliminating the fear of liquid leakage, as it generates electricity through reaction of hydrogen with oxygen (Figure 1). In addition to its safety, PEFC ensures quick start-up and shutdown due to its low operating temperature as well as portability due to its compactness and lightweight. Thus, demand for PEFC is expected to grow rapidly.

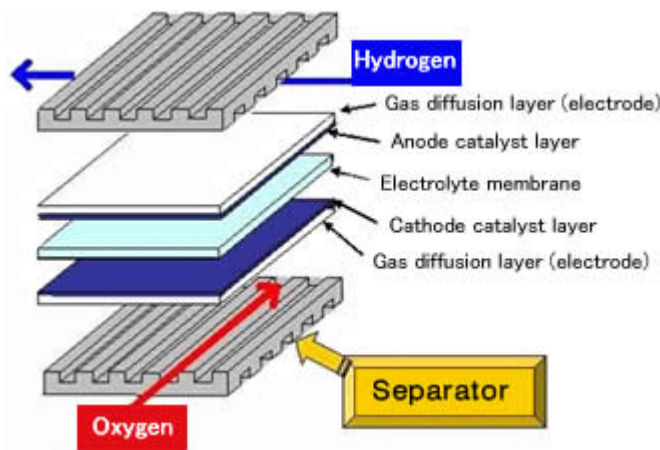
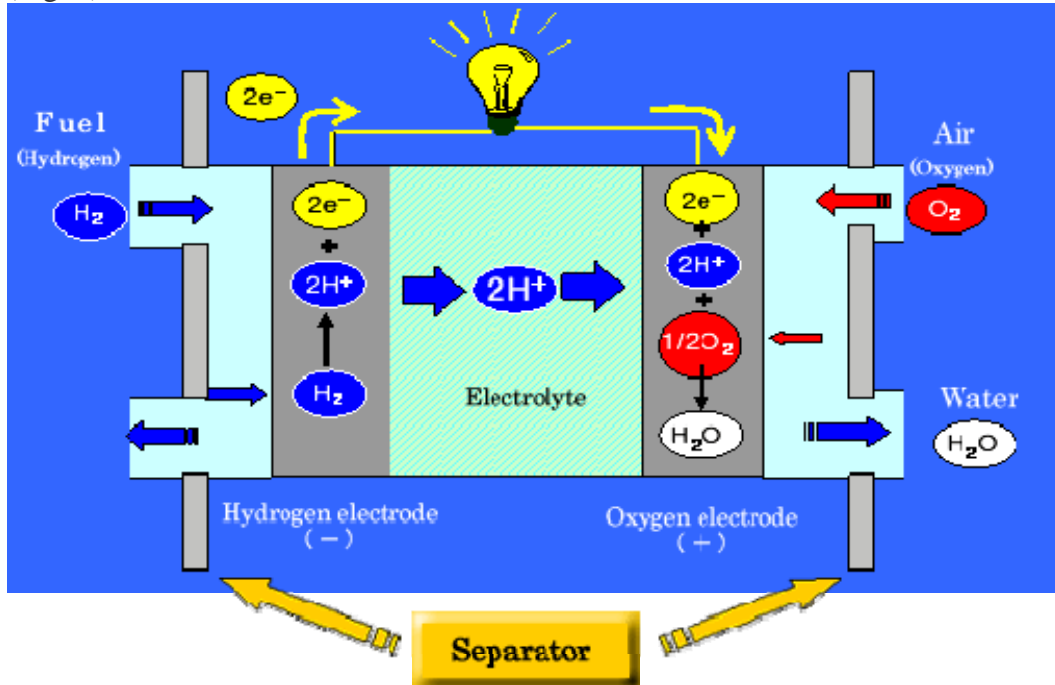
The separator is an important component of PEFC, separating each cell and efficiently providing hydrogen and oxygen in completely separate flows (Figure 2). PEFC is used in a stack connecting many fuel cells in series to provide enough electricity (Figure 3). Separators are required to have high levels of gas barrier property, electrical conductivity, mechanical strength, durability and processability. The newly developed separator has the following advantages:

1.  
High electrical conductivity: Fully utilizing its long experience in the production of artificial graphite, SDK has developed a new grade of artificial graphite consisting of fine particles with optimized shape and size distribution. The new grade has electrical conductivity approximately 10 times that of conventional artificial graphite.
2.  
High mechanical strength and durability: SDK has established a new technology to produce a composite material of artificial graphite and resins. The separator based on this technology has high mechanical strength and durability (resistance to cracking) when artificial graphite is mixed with thermosetting or thermoplastic resins.
3.  
Low cost: SDK has established a high-speed molding technology to produce a separator sheet within about 15 seconds. This will enable reduction in the separator cost through mass production.

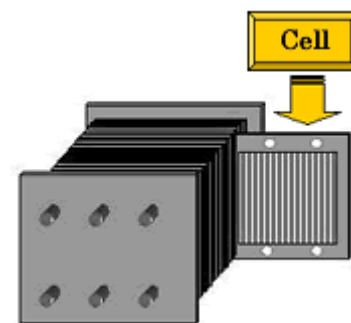
The new product is comparable to machined graphite separators in electrical conductivity and durability. Furthermore, the new product has higher flexural strength (crack resistance) and cost advantages. Compared with metallic separators, the new product is

far more corrosion-resistant and lighter. SDK will provide samples to PEFC makers for evaluation and continue to participate in the NEDO project for further improvement. SDK is expanding the battery materials business as one of the strategic growth businesses under the Sprout Project. The separator represents an example of the interconnections of inorganic (graphite fine powder) and organic (resin selection and processing) chemical technologies.

(Fig. 1) Construction of Fuel Cell



(Fig. 2) Cell



(Fig. 3) Fuel Cell Stack