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PEMFC용 코팅 금속 분리판의 특성
Characteristics of Coating applied Metallic Bipolar Plate for PEMFC

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Fuel cells are devices that convert the chemical energy of a fuel directly into electrical energy. Due to its high efficiency and cleanliness as a power source, polymer electrolyte fuel cells (PEMFC) have attracted much interest. In a typical fuel cell, hydrogen and oxygen react electrochemically at separate electrodes producing electricity, heat and water.

Bipolar plate, which forms about 50% of the stack cost, is an important core part with polymer electrolyte membrane in the fuel cell. Its role is to supply reactant gases to the fuel cell electrode and to provide electrical connection between adjacent cells in the stack whiles removing water product from the cell and transferring away the heat of reaction. Therefore, it is absolutely essential to develop material and manufacturing technology for the automotive FEMFC. Bipolar plates have been commonly fabricated from graphite material having high electrical conductivity and corrosion resistance. Lately, many researchers have recently concentrated their efforts on the development of metallic bipolar and stainless steel has been considered as a potential materials for metallic bipolar plate because of its high strength, chemical stability, low gas permeability and applicability to mass production. However, it has been reported that its inadequate corrosion behavior under PEMFC environment led to a deterioration of membrane by dissolved metal ions and a increase in contact resistance by growth of passive film, therefore, its corrosion resistance as well as contact resistance must be improved for bipolar plate application.

Previously, we reported that surface coating is one of the way to achieve the high corrosion resistance and conductivity. In the present study, several coating systems were applied to achieve high corrosion resistance and low interfacial contact resistance. This study reports the corrosion and contact resistance of 316L stainless steels coated by wet or dry method under PEMFC simulated environment. In addition, their cell performances were examined carefully and are presented in this study.