

## 고분자 전해질 연료전지 분리판용 316 스테인리스강의 전기전도도에 미치는 Nb, Ti 첨가 및 표면처리 효과

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## Effects of Nb and Ti Addition and Surface Treatments on the Electrical Conductivity of 316 Stainless Steel as Bipolar Plates for PEMFC

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**Abstract** Nb and Ti were added to 316 stainless steel, and then heat-treatments and surface treatments were performed on the 316 stainless steel and the Nb- and Ti-added alloys. All samples indicated enhanced electrical conductivity after surface treatments, whereas they showed low electrical conductivity before surface treatments due to the existence of non-conductive passive film on the alloy surface. In particular, the Nb- and Ti-added alloys showed remarkable enhancement of electrical conductivity compared to the original alloy, 316 stainless steel. Surface characterization revealed that small carbide particles formed on the alloy surface after surface treatments, while the alloys indicated flat surface structure before surface treatments.  $Cr_{23}C_6$  mainly formed on the 316 stainless steel, and NbC and TiC mainly formed on the Nb- and Ti-added alloys, respectively. We attribute the enhanced electrical conductivity after surface treatments to the formation of these carbide particles, possibly acting as a means of electro-conductive channel through the passive film. Furthermore, NbC and TiC are supposed to be more effective carbides than  $Cr_{23}C_6$  as electro-conductive channels of stainless steel.

**Key words** : PEMFC, Bipolar plate, Contact resistance, 316 stainless steel, Carbide

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