고온/저 가습 운전을 위한 고분자 전해질 연료전지용 전극 개발

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Developement of a PEFC electrodes under the high temperature and low humidified conditions.

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Abstract : Generally, Nafion ionomer is used in the polymer electrolyte fuel cell (PEFC) electrodes to achieve high power density. At the high temperature operation of PEFC, however, ionic conductivity of Nafion remarkably decreased due to the evaporation of water in Nafion polymer. Recently, many researchers have focused on using the Ionic Liquids(ILs) instead of water in Nafion polymer. ILs have intrinsic properties such as good electrochemical stability, high ionic conductivity, and non-flammability. Especially, ILs play a crucial role in proton conduction by the Grottuss mechanism and act as water in water-free Nafion polymer. However, it was found that the ILs was leached out of the polymer matrix easily.

In this study, we prepared membrane electrode assemblies with various contents of ILs. The effect of ILs in the electrode of each designed was investigated by a cyclic voltammetry measurement and the cell performance obtained through a single cell test using H2/Air gases. Electrodes with different contents of ILs in catalyst layer were examined at high temperature and low humidified condition.

Key words : High temperature polymer electrolyte fuel cell(고온형 고분자 연료전지), Ionic liquid(이온 전도성 액체), Membrane electrode assembly(막 전극 접합체)

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