인산형 연료전지용 촉매 분산된 탄소전극의 촉매 활성도에 미치는 표면생성물의 영향에 관한 연구

The Effect of Surface Group on the Catalytic Activity of Catalyst-Dispersed Carbon Electrode for Phosphoric Acid Fuel Cell(PAFC)

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The effect of surface group on the catalytic activity of 10 wt.% Pt-dispersed carbon(Pt/C) and 10 wt.% Pt-Co-Fe alloy dispersed carbon (Pt-Co-Fe alloy/C) electrodes has been investigated as functions of applied potential and duration in 85% H_3PO_4 solution at 145℃ by using Fourier transform infra-red(FT-IR) spectroscopy, potentiodynamic polarization experiment, and ac-impedance spectroscopy. For this purpose, the catalyst-dispersed carbon electrodes were previously subjected to various applied cathodic potentials of 200, 300, 400, 500, 600, 700 and 800 mV_{RHE} for different durations of 1, 2 and 3h. After that, the specimens used for FT-IR spectroscopy were prepared by pressing the mixture of pretreated catalyst-dispersed carbon powder and KBr powder. There was an abrupt increase in the peak intensity of FT-IR spectrum, indicating the formation of carboxyl group in large amount above 700 mV_{RHE}. From this result, it was suggested that carboxyl group plays a major role in sporadic formation of the surface group on the carbon electrode under operating condition of phosphoric acid fuel cell(PAFC). From the potentiodynamic polarization experiment and ac-impedance spectroscopy, decreased catalytic activity and increased charge transfer resistance were shown due to the increased amount of surface group. The experimental results have been discussed in terms of the catalytic activity depending on applied cathodic potential and duration.

Reference

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