Electrochemical characteristics of Membrane Electrode Assemblies based on the Sulfonated poly (arylene ether sulfone) ionomer as a cathode binder for Polymer Electrolyte Fuel Cells

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Polymer electrolyte fuel cells(PEFCs) are promising energy devices for stationary, potable, and transportation due to their high efficiency and low pollutant emissions. For the practical commercialization of PEFCs, performance, durability and cost need to be improved. A proton-conducting polyelectrolyte is used not only as the membrane but as the catalyst layer of the electrode, especially, Perfluorosulfonic acid(PFSA), such as Nafion are state-of-the-art and most used. As an alternative to PFSA, hydrocarbon polyelectrolytes, such as SPAES, SPEEK, SPAESK, SPI, SPB have been developed in recent years for they have several advantages, such as their low cost and low environmental contamination. Since the characteristics of a polyelectrolyte required for the membrane an the catalyst layer are substantially different, the catalyst layer needs to be optimized separately from the membrane. Especially, The reaction and transport at the cathode are slower than those at the anode. Therefore, the processed at the cathode were the focus of this study. We used to materials that NRE212 as a electrolyte, Nafion as a binder of anode electrode and SPAES as a binder of cathode electrode(herinafter "C-SPAES MEA"). Effect of dispersion solvent, such as IPA, NMP, DMAc, for cathode electrode are discussed kinetic of oxygen reduction reaction(ORR) and oxygen gain with different relative humidity for using C-SPAES MEA.