

Applying PTFE binder in Gas Diffusion Electrode for high temperature PEMFC

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The high-temperature polymer electrolyte membrane fuel cell (HT-PEMFC) is operated over 120 °C, so it uses phosphoric acid (PA) instead of water and Nafion® for proton conductor. The polymer binder such as polytetrafluoroethylene (PTFE), are used to maintain the electrode structure and PA distribution. PTFE is not dissolved in a solvent like N-methyl-2-pyrrolidone(NMP), dimethyl acetamide (DMAc), only dispersed in alcohol type solvent like Isopropanol (IPA) so the most electrode is produced by spray method. In this study, for short production process of gas diffusion electrode (GDE) using PTFE binder, we searched suitable solvent and slurry composition ratio for the bar coating method. Ethanol, isopropyl alcohol, n/iso/tert-Butanol are selected as a solvent and a surfactant is added to make uniform dispersion. Produced GDEs using different solvent are compared the characters through SEM-EDX mapping, mercury pore analysis and MEA test. The polarity of each solvent decides a property of electrode that dispersion and porosity of electrocatalysis layer. The GDE using IPA as a solvent shows similar MEA performance the GDE using PVDF binder that was produced by the bar coating method.