Chemical Modification of Perfluorosulfonate Ionomers with Cationic Polyaniline for DMFC

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Nafion-polyaniline composite membranes were prepared by chemical in-situ polymerization of aniline with amomoinum peroxodisulfate as an oxidant. Using different pH of the aqueous solution, two types of Nafion-polyaniline composite membrane were obtained, emeraldine salt (ES) form and perniganiline base(PB) form. To obtain Nafion-polyaniline (ES) membrane, pretreated Nafion membrane was immersed in aniline solution of aqueous 1.0M HCl and then aniline solution was replaced by $(NH_4)_2S_2O_8$ solution. A Nafion-polyaniline(PB) composite membrane was prepared with aniline solution of aqueous 0.1M NH_4OH. The physicochemical properties of Nafion-polyaniline composite membranes for DMFC were depended on the types of oxidation states, emeraldine salt (ES) form and perniganiline base (PB) form. The Nafion-polyaniline composite membranes were extensively characterized using scanning electron microscopy (SEM), infrared (FTIR-ATR), and thermogravimetric (TGA). The transport properties were also evaluated by conductivity and methanol permeability.