

Effect of Polyaniline on Transport Properties of Nafion/Polyaniline Composite Membrane for DMFC

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We prepared Nafion/polyaniline (Naf/PANI) composite membrane by in-situ chemical polymerization of aniline. Especially, Naf/PANI membrane was extensively characterized using several techniques in order to understand how the microstructure of this composite membrane influences its physicochemical and transport properties in DMFC applications. Nafion membranes were modified by chemical polymerization of aniline using ammonium peroxodisulfate as the oxidant. The existence of polyaniline in the Nafion matrix reduced methanol crossover more than the proton conductivity. The physicochemical properties of Nafion/polyaniline (Naf/PNAI) composite membranes were characterized by infrared (FTIR-ATR), scanning spectroscopy (SEM), differential scanning calorimetry (DSC), small-angle X-ray scattering (SAXS), and wide-angle X-ray diffraction (WAXD). Water uptake and methanol uptake tests, conductivity and permeability were measured for transport properties of composite membranes.