Development of Anion-Exchange Membranes and Non-Precious Catalysts for Solid Alkaline Fuel Cells

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Solid alkaline fuel cells (SAFCs) are a new type of fuel cells based on electrochemical reactions and electromigration of OH- ions. For those OH- participation, anion-exchange membranes, precious and/or non-precious electrocatalysts are employed. In this study, chloromethlyated polysulfone-based AEMs aminated by mono- and/or diamine were prepared. To investigate the effect of akylchain length of diamine on the membrane properties, several diamines such as TMMDA, TMEDA, TMPDA, TMBDA and TMHDA were used for amination. For non-precious catalysts, Ni-based electrocatalysts using $Ni(OH)_2$ and $NiCl_2$ precursors were prepared on Vulcan XC-72. Those electrocatalysts were used to prepare the anode and the commercially available Ag/C (20wt.%, E-Tek, USA) the cathode. Using the anion-exchange membranes and electrocatalysts, membrane-electrode assemblies (MEAs) were fabricated and evaluated at H2/air, 50~100% RH, 40~80 °C and ambient pressure.