Investigation of anion-exchangeable chloromethylated polysulfone for the preparation of ionomer binder for solid alkaline fuel cells

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Solid alkaline fuel cells (SAFCs) use anion-exchange membranes as electrolyte. To fabricate membrane-electrode assemblies (MEAs), development of ionomer binder is required to prepare electrodes. The ionomer binder should be the same or similar to the electrolyte used in the MEAs. Ionomer binder in MEAs plays an important role in providing proton, gas and electron accessibility from the outer surface of electrode to that of electrolyte depending on its composition in the catalyst slurries. Ionomer binders should be anion-exchangeable, thermally stable in the operation range of SAFCs and easily usable for the preparation of catalyst slurry. In this study, to develop such an ionomer binder, the type of solvent, dissolution method and other important parameters such as dissolution temperature, pressure and time were considered and optimized. The ionomer binders developed were characterized by the degree of dissolution, re-precipitation, easiness of preparation and electrochemical properties.