Hydrocarbon-based block electrolyte membranes for fuel cell applications

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The polymer electrolyte membrane fuel cell (PEMFC) has received considerable attention due to its high energy efficiency and absence of carbon dioxide emission. Perfluorosulfonic acid (PFSA) polymers are the most promising and state-of-the-art as polymer electrolyte membranes for PEMFC. However, PFSA membranes suffer from some drawbacks such as high production cost, poor thermo-mechanical properties above 80 °C, environmental incompatibility, and high permeability of fuels and oxygen. In order to solve above these problems, novel hydrocarbon-based ionomer membranes have been developed. In this presentation, recent researches on the hydrocarbon ionomer membranes will be discussed. The main concern is how to improve the proton conductivity under high temperature and low RH without sacrificing chemical and physical properties of membranes. One of the successful approaches includes sulfonated poly(arylene ether sulfone) multi-block membranes with enhanced hydrophilicity in the hydrophilic In addition, fuel cell performances and long-term stabilities of these membranes are discussed together with future prospects of the membrane development.