

Sulfonated poly(arylene ether sulfone) composite ionomer containing tetraethyl orthoicate for high temperature operable PEMFC

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Hydrocarbon-type ionomers have been stated as possible alternatives to the current commercial perfluorinated ionomer, which are costly and limited in performance and durability at elevated temperature over 120°C. As a key component of electrode, the electrode ionomer forms the ionomer network in the catalyst layer and acts as a proton conducting medium that was associated with water, especially bound water.

In recently years, sulfonated poly(arylene ether sulfone) (SPAES) composite membrane containing tetraethyl orthosilicate (TEOS) have previously been shown to possess higher proton conductivity and better heat stability compared to Nafion 212 membrane at elevated temperature and low humidity due to higher bound water concentration in polymer matrix. In this work, various membrane electrode assemblies (MEAs) were prepared with SPES ionomers containing TEOS in various ionomer solvents such as NMP, DMAc, and IPA. The prepared MEAs were comparatively investigated by analyzing electrochemical properties (i.e., polarization curve, impedance, cyclic voltammogram).