

Investigation of a PEM water electrolyzer based on a sulfonated polysulfone membrane

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A sulfonated polysulfone (SPSf) membrane was prepared and used as polymer electrolyte in water electrolysis cell. The behaviour of SPSf in PEMWE was investigated by polarization, electrochemical impedance spectroscopy, chrono-amperometry and H₂ crossover measurements. The performance was compared to a commercial Nafion 115 membrane. A low series resistance of 0.13 $\Omega\cdot\text{cm}^2$ was measured for the SPSf membrane at 80 °C under water electrolysis. At the same potential value, 1.8 V, the current density values in the polarization curves were 1.29 A·cm⁻² and 1.08 A·cm⁻² for the cells with Nafion and SPSf membrane, respectively. During a chrono-amperometric measurement, the current density remained constant throughout the test, indicating a suitable stability of the SPSf based cell. The good performance, low H₂ permeability, low cost and excellent lifetime stability of SPSf make this polymer a promising solid electrolyte for the application in high pressure PEM electrolyzers.

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