

Effect of V-Shaped Baffle Angles and Spacings in Flow Channels on the Performance of a High-Temperature Proton-Exchange-Membrane Fuel Cell

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Abstract : A high-temperature proton-exchange membrane (PEM) fuel cell (FC) functions at temperatures above 100 °C, requiring less moisture to transfer protons and developing CO tolerance contrasted with a low-temperature PEMFC. The study then meticulously evaluated the specific effects of varying the angles (45 degrees, 60 degrees, and 75 degrees) and spacing of the V-shaped baffles on a high-temperature PEMFC's net power. The best baffle configuration of nine baffles (spacing=5 mm) significantly improves performance at all angles. In particular, the 60-degree angle baffle is most effective within gas flow and oxygen distribution, promoting the fuel cell's overall performance. This study also produces a flow channel plate with the best V-shaped baffle to conduct battery performance experiments and verify the results of experiments and simulations. Furthermore, the total impedance of the duct with nine V-shaped baffles is less than that of no baffles, according to the electrochemistry impedance spectroscopy (EIS) experiment.

Keywords : high-temperature proton-exchange-membrane fuel cell, performance promotion, v-shaped baffles, angles and spacing of baffles, polarization performance experiments, electrochemical impedance spectroscopy test, performance, electrochemical impedance spectroscopy

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