

عنوان مقاله:

Study of Contact Pressure Distribution over MEA of the Three-Cell PEMFC with Metallic Bipolar Plates

محل انتشار:

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خلاصه مقاله:

One of the parameters that play an important role in the efficiency of polymer electrolyte membrane fuel cells (PEMFCs) is the contact pressure between the bipolar plates and membrane electrode assembly (MEA). Increasing or decreasing the contact pressure between the plates causes ohmic losses and decreases the efficiency of the fuel cell. In this research, the contact pressure distribution over the MEA in the three-cell fuel cell stack with metallic bipolar plates with an active area of 100 cm^2 was investigated numerically and experimentally. Abaqus finite element software has been used for finite element simulation. Due to the asymmetry of the flow field of metallic bipolar plates, a full three-dimensional model has been used for simulation. In order to experimentally investigate the contact pressure distribution on the MEA, the pressure sensitive film of Fujifilm was used. Considering that the fuel cell stack includes three cells, pressure sensitive film is used in the middle cell and thin insulating plates are used in the first and third cells. Finally, after disassembling the fuel cell stack and separating the pressure sensitive film, the experimental test results are compared with the simulation results. The simulation results showed that the pressure changes on the active area are less than 0.3 MPa . The average contact pressure on the active area with a press force of 3.7 tons is about 1 MPa . Also, the results of the experimental tests were in good agreement with the simulation results

کلمات کلیدی:

PEMFC stack, Contact pressure distribution, metallic bipolar plates, pressure sensitive film

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