

عنوان مقاله:

The effect of bipolar plate material and clamping pressure on the performance of proton exchange membrane fuel cell

محل انتشار:

هفتمین کنگره ملی مهندسی شیمی (سال: 1390)

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خلاصه مقاله:

The bipolar plate (BP) is one of the most important devices in the proton exchange membrane fuel cell (PEMFC). Recently, due to its better properties regarding metallic and graphite BP, this device, has mainly been made in the polymer-based composites with carbon fillers. In this research, some composites with graphite (G), expanded graphite (EG) and carbon fiber (CF) as fillers were made in two percentages. Then electrical resistivity (ER) of composite-BPs and their interface contact resistance (ICR) with GDL were measured in various clamping pressure (CP). In this research, the EC and ICR of composites, as the ohmic resistance, were introduced into the electrochemical relations of one isothermal model of PEMFC. In addition, the formulation of permeability and diffusivity in gas diffusion layer (GDL) under the CP were derived. Afterwards the electrochemical performance (V-I curve) of PEMFC in various composites were obtained and analyzed. In addition, CP affecting ICR and GDL diffusivity were introduced into the model so that the performance could be derived. The results indicated that the ER and ICR values of BP play a major function in the electrochemical performance but the ICR function is much greater than that of ER. Other results revealed that CP has a great effect upon ICR, thereby affecting the performance of PEMFC.

کلمات کلیدی:

Modeling; PEMFC; composite bipolar plate; contact resistance; performance

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