

Study on the Injection Molding Technology for Fuel Cells Bipolar Plates with Carbon Fiber Distribution

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Abstract

In this study, there are two designs of mold insert that one is a flat insert, the other is channel insert and the material is polycarbonate blended with 4% carbon fiber. For studying fiber distribution, the bipolar plate was molded using different filling velocity(50mm/s, 65mm/s and 80mm/s) and channel layout direction, and the fiber distribution along the thickness-direction was measured by SEM to investigate the influence of filling velocity and channel layout on distribution. By obtaining the best fiber distribution at the results of previous experiment, influence of filling velocity and channel layout on resistance was investigated using polystyrene blended with 30% carbon fiber. The relationship between fiber distribution and resistance was studied.

From the results, the fiber distribution is uniform at low velocity(50mm/s), but the low concentrations of conductive fiber appear near gate and at the end of flow for all kinds of filling velocity. As filling velocity raises to 60 mm/s or 80 mm/s, the concentrations gradually reduce from gate to end of flow. Therefore the filling velocity influences fiber distribution. On the channel layout, as channel is perpendicular to filling direction, the fibers are rolled and banded together, and the conductivity can be improved about 50% compared with channel parallel to filling direction. This study can offer guide lines of channel layout and gate position for bipolar.

Keywords : Fuel cell, bipolar plate, injection molding, carbon fiber