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Abstract
Bipolar plate occupies most volume and weight in a fuel cell stack. The main functions of bipolar plate are current collection and delivery, gas distribution, gas leak preventation and thermal management. Therefore, at present, many national research institutions and industries have invested lots of efforts on bipolar plate in terms of material selection, processing changes, the flow field pattern design and thermal distribution control. The key points of future development are to improve the efficiency of fuel cell and to reduce both the size and weight of bipolar plate.
This experiment used three different materials to make flow field plate with thin film coating. The flow field plates are made of carbon graphite, SUS316L stainless steel and AL6061 aluminum alloy respectively. To accommodate the environment of Fuel cells, a non-physical balance magnetron sputtering equipment was introduced to form CrN coating on the substrates with a combined function of conductivity, corrosion-resistance and hydrophobic characteristics. To compare the characteristics, a same flow pattern design was adopted. The flow field pattern used in this study was parallel flow by the ratio of channel: rib = 1mm: 2mm. The results after comparison were:
Carbon-graphite with CrN coating > carbon-graphite> SUS316L stainless steel with CrN coating > SUS316L stainless steel> AL6061 aluminum alloy with CrN coating > AL6061 aluminum alloy
Keyword：bipolar plate, CrN coating, fuel cell, flow field plate
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