A Study of Using Plastic Bipolar Plates in Assembling Fuel Cell Stacks

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ABSTRACT

The bipolar plates of PEMFC's are made of graphite plate by using milling machines, which makes the cost of bipolar plates constitute a large portion of that of fuel cell stacks. Furthermore, more than 80% of the weight of a fuel cell stack comes from the bipolar plates. Although researchers in the field of fuel cells have conducted so much R&D work relevant to the bipolar plate technology, good solutions to this problem is still yet to come. Plastics are not electrically conductive and are poor thermal conductors, but they have the advantages of ease of mass production and low cost. The present thesis proposes a novel design of bipolar plates which can be formed by injection or compression molding process using plastic materials and a current collector can be inset on its surfaces. The current collector together with the gas diffusion layer can conduct electrons easily under certain operating conditions and stack designs. In air-breathing PEMFC's, the low thermal conductivity of plastic materials should pose no problem for heat transfer. The main purpose of the present research is to investigate the feasibility of applying the plastic bipolar plates in the air-breathing PEMFC's.

Keywords : Fuel cell stacks ; PEM ; Bipolar plates

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