

The hybrid conductive filler in the bipolar plate for polymer electrolyte membrane fuel cells

ABSTRACT

Polymer Electrolyte Membrane Fuel Cells (PEMFC) can be an efficient energy generator as it offers attractive potentials for certain mobile and portable applications. In PEMFC, the bipolar plate is one of the most important components, and it is multi-functional. This study proposes the use of Graphite (G) and Carbon Black (CB) as hybrid conductive fillers, and Epoxy as the material binder in the bipolar plate. G is used as the main filler, while CB as the second filler materials. The hybrid fillers and the binder were shaped through compression moulding. The effects of different CB contents on the properties of the composite were also observed. The results showed that the decreasing of electrical conductivity was correlated with the increasing of CB content. The different CB contents also resulted in some improvements in other properties such as shore hardness and sample bulk density. The findings promise an enhanced performance of the bipolar plate to be used in PEMFC which is beneficial for mobile and portable application industry. A further study on agglomeration and the mechanical properties such as the flexure strength should be pursued.

Keyword: PEMFC; Graphite; Carbon black; Composite bipolar plate; Electrical conductivity