

Fabrication of multi-filler MCF/MWCNT/SG-based bipolar plates

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Abstract:

In this study, the milled carbon fibre (MCF), multi-walled carbon nanotubes (MWCNT), synthetic graphite (SG) and polypropylene (PP) were fabricated using the compression moulding technique to produce a bipolar plate. The electrical conductivity and mechanical properties of the composite materials were also investigated based on different applied compositions. The studies indicated that compositions of 5PP/11MCF/1xGNP/3SG obtained the highest mechanical performance; 30 HD at 1.3 g/cm³ due to the homogenous filler dispersion within the polymer resin. These were attributed to good electrical conductivity (3.32 S/cm) compared to 5PP/13MCF/1xGNP/2SG at 1.3 S/cm. The addition of primary filler (MCF) addition onto the composite mixture was investigated, although the electrical conductivity appeared to deteriorate. The studies also reported that the composite mixture was able to withstand high-temperature application (~ 400 °C). The results obtained from this study revealed that the different filler geometry would results in different material performance. Therefore, it is important to be discussed especially in high-temperature bipolar plate applications.