Comparison of Compression Molding and Selective Laser Sintering Processes in making Composite Bipolar Plates for PEM Fuel Cells
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ABSTRACT
Bipolar plates are key components of Proton Exchange Membrane (PEM) fuel cells. To attain electrical conductivity and adequate mechanical strength, graphite-polymer composite plates were manufactured using Compression Molding (CM), which is suitable for mass production, and Selective Laser Sintering (SLS), which is suitable for making prototypes. In this paper, the electrical conductivity and flexural strength of the bipolar plates fabricated using the CM process versus constitutive materials were experimentally studied. The properties of bipolar plates fabricated using three series of CM process were compared with those of plates fabricated using the SLS process, and the SEM images were used to illustrate the microstructures of selective fabricated specimens. The results showed that SLS was able to fabricate bipolar plates with very good mechanical and electrical properties compared to the CM process. Moreover, mixing solid polymer resin rather than liquid epoxy resin with solid constitutive materials and using graphite with longer aspect ratio enhanced the mechanical strength significantly, and improved the electrical conductivity of the composite plate, respectively.

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