

179e Development of Composite Bipolar Plates with High through-Plane Conductivity

Jianhua Huang and Donald G. Baird

It has been shown in our previous work that wet-lay composite sheet materials containing up to 70% graphite can be compression molded to form bipolar plates with excellent mechanical properties, high in-plane electrical conductivity and the potential for rapid manufacturability. In this work attempts were made to improve the through-plane conductance of the bipolar plates. Various methods were tried including the use of wet-lay sheets with higher graphite contents, stacking the wet-lay sheets in a direction perpendicular to the compaction direction of the mold, and using wet-lay composite materials together with mixtures of polymer and graphite powders. It was found that all these approaches could, more or less, improve the through-plane conductance of the bipolar plates. In particular, the half-cell resistance of the bipolar plate could be decreased from 0.027 Ohm-cm² or higher to less than 0.010 Ohm-cm² by simply compression-molding the wet-lay sheets with the mixture of polymer and graphite particles.