

Thesis Title Preparation of Electrical Conductive ABS Composite for Bipolar Plates in PEM Fuel Cell

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Degree Master of Science (Industrial Chemistry)

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ABSTRACT

In this research, preparation of electrical conductive ABS composite for use as bipolar plate in place of the conventional graphite bipolar plate, which is expensive and has low mechanical properties, was studied. The electrical conductive ABS composites were prepared by the addition of conductive fillers, such as graphite, carbon black and carbon fiber in the ABS matrix. The effects of filler content and the incorporation of fillers on the electrical and mechanical properties were studied. Moreover, the influence of silane coupling agent and carbon fiber length were also investigated. The results showed that the ABS composites with silane-treated graphite had higher electrical conductivity than the ABS composite with non-treated graphite. Moreover, it was found that at 75 wt% of fillers the ABS composites with 2 and 3 combined fillers provided the higher electrical conductivity and higher mechanical properties than the ABS composite with single filler. The ABS composite with treated-graphite and carbon black and the ABS composite with treated-graphite, carbon black and carbon fiber provided the electrical conductivity of 36.13 and 36.20 S/cm, respectively, while the electrical conductivity of ABS composite with treated-graphite was 7.65 S/cm. In addition, it was discovered that the ABS composites with combined fillers have higher mechanical properties. The length of carbon fiber of 3, 5 and 10 millimeters were examined and found that the length of 5 millimeters provided superior properties.