**Model-Guided Development of Advanced, Low-Cost Anion-Exchange Membrane Fuel Cells**

A. Abstract

The research has focused on designing and testing anion-exchange membrane fuel

cells (AEMFCs). The results mentioned herein include a novel, milestone model of

AEMFC performance stability and additional conclusions on anion-exchange

membranes' (AEM) behavior in realistic, CO2-containing air. These results have been published in peer-reviewed papers (attached below). The preparation of non-Pt

electrodes and their testing in fuel cells has not yet been published and is presented in the following section.

**This research is in the sphere of fuel cells, which are devices that produce electricity from chemical energy and are particularly efficacious in electrically driven vehicles. There are many different types of fuel cells, with different features and areas of application. This research is concerned with the design and testing of anion-exchange membrane fuel cells (AEMFCs), which could be a very attractive, cost-effective, portable electricity solution, subject to overcoming a few obstacles. In particular, current AEMFCs are somewhat unstable and have a limited lifetime due to anion-exchange membrane (AEM) decomposition during operation. The AEM decomposition is due to a number of factors; in this research, we model the complex interaction of factors influencing AEM stability to gain a deeper understanding of AEM behavior in different environments in order to predict and optimize AEMFC performance. Initial results have been published in peer-reviewed papers and new results (regarding particular electrodes in AEMFCs) are presented herein.**