Characterization of Nanotube Enhanced PEM Fuel Cells

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Proton Exchange Membrane (PEM) Fuel Cells are a clean method of generating electricity. They utilize a reaction of gaseous H_2 and O_2 to form common H_2O waste and release stored energy. At their core, PEM fuel cells are constructed of three major layers: the anode, the PEM, and the cathode. The majority of PEM fuel cells utilize Nafion™ (polyperfluorosufuric acid) as the exchange membrane. Nafion™ is often also used to produce the composite films used as the anode and cathode. Catalytic separation of H_2 into H^+ is provided by platinum catalysts in the anode. Platinum is also the most commonly used catalyst to separate the O_2 into atomic oxygen in the cathode. In order to enhance the electrical and ionic transport in the fuel cell electrodes we have been investigating the use of high purity single wall carbon nanotubes. We have developed an experimental setup and measurement protocols to evaluate different composite fuel cell materials. A comparison of commercially obtained E-tek fuel cell materials to our single wall carbon nanotube composites will be presented.