

Abstract Submitted
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X-ray degradation studies of Nafion in a PEM fuel cell REBECCA JENKINS, JUAN FRAGOSO — The overall goal of this research is to test for degradation of the Polymer Electrolyte Membrane (PEM) fuel cells due to exposure to ionizing radiation. We have successfully developed a Membrane Electrode Assembly (MEA) that can be fully disassembled down to the bare Proton Exchange Membrane (PEM) and reassembled repeatedly. This is crucial for testing the degradation effects on the individual components of the MEA. It was also important to establish baseline repeatability of the polarization curves of the MEAs. Therefore, we systematically varied different parameters to test their effect as well as to establish consistent experimental procedures. Hydration of the fuel cell has been found to be crucial for repeatable results. These polarization curves showed voltages that ranged from 0.4V to 1.0V and current densities up to 11mA/cm². The Nafion can then be exposed to an x-ray source and the respective polarization data can be studied. A working fuel cell has also been built that fits into the microwave cavity of an electron paramagnetic resonance spectrometer. This allows for study of in situ behavior of free radicals formed in a normal operational fuel cell as well as fuel cells with x-ray exposed membranes.

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