119a Magnetic Resonance Imaging (Mri) Microscopy of Operating Direct Formic Acid Fuel Cell (Dfafc)

Su Ha, Zachary Dunbar, and Richard I. Masel

We use Magnetic Resonance Imaging (MRI) to examine the spatial distributions of water and fuel in an operating direct formic acid fuel cell (DFAFC). Achieving both proper water and fuel distributions in the DFAFC are critical issues in its future device design. Too much water in the cathode would cause the water flooding and limit the oxygen transport to the cathode electrode. If the CO_2 bubbles are not properly removed from the DFAFC's anode, they will block the catalyst sites from oxidizing formic acid and create a large pressure drop across the flow channels. However, presently there is a lack of in situ measurements of reactant and product distribution profiles in the operating DFAFC to broaden our understanding of its transport dynamics. In this paper, we have demonstrated a novel methode of using MRI technology to measure the water and fuel distributions in its cathode and anode respectively.