

## V.A.8 Technical Assistance to Developers

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Project Start Date: October 2003  
Project End Date: Project continuation and  
direction determined annually by DOE

### Objectives

- Assist technically, as directed by DOE, fuel cell component and system developers.
- Test materials and components and provide feedback to customers.
- Support the development and testing of durability protocols with the US Fuel Cell Council (USFCC).
- Provide support to the U.S. Council for Automotive Research (USCAR) and the USCAR/DOE Freedom Cooperative Automotive Research (FreedomCAR) Fuel Cell Technical Team.
- Validate technical findings as directed by DOE.

### Technical Barriers

This project can be directed to address any of technical barriers from the Fuel Cells section (3.4.4.2) of the Fuel Cell Technologies Program Multi-Year Research, Development and Demonstration Plan (MYRDDP), however it principally addresses:

- (A) Durability
- (B) Cost
- (C) Performance

### Technical Targets

In this particular task, any of the technical targets in the MYRDDP Table 3.4.4 may be addressed at any given time. Specifically, select tasks that apply to the technical targets in this project are listed below, while their status is listed in the 'Accomplishment' section.

- Provide continued testing insight and advice to DOE principal investigators.
- Testing of materials and participation in the further development and validation of durability test protocols with the USFCC.
- Offering technical assistance to USCAR and the USCAR/FreedomCAR Fuel Cell Technical Team.
- Participating in working groups and review meetings.



### Approach

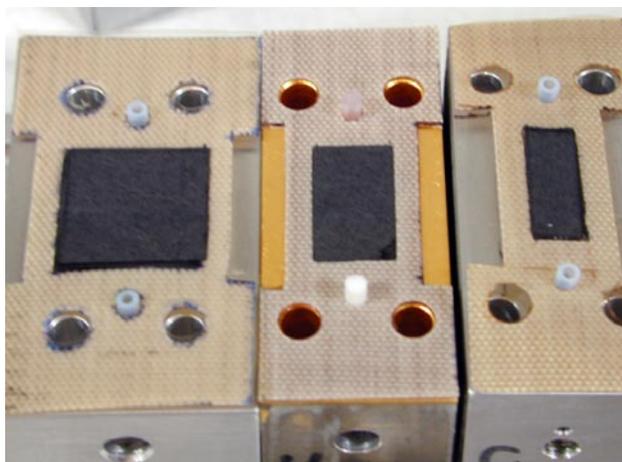
Our approach has consistently focused on collaborative-type interactions as guided by DOE. A large portion of this effort goes unpublished, for proprietary reasons. However in this fiscal year, we have continued to provide testing support and actively participated in developing test protocols. In addition, LANL has provided hands-on short courses on several fuel cell topics.

### Accomplishments

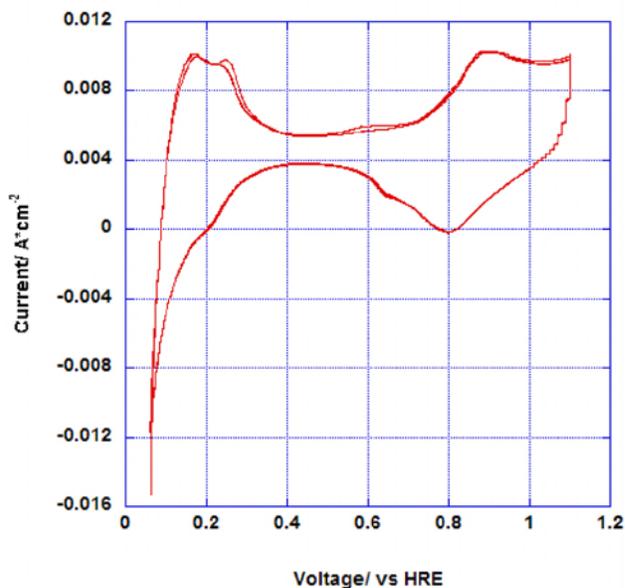
- Honored several invited presentations.
- Hosted numerous visitors to LANL.
- Collaborated with multiple industrial, university, or laboratory partners.
- Provided test insight and/or results to several DOE principal investigators.
- Participated in the review and development of USFCC durability protocols.
- Held Hands-On Fuel Cell Short Course.

### Highlights

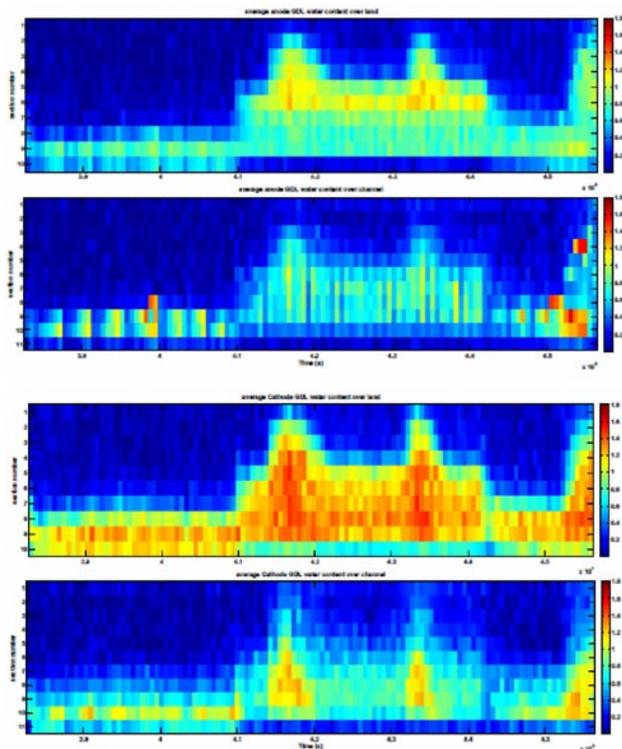
Figures 1-5 show some highlights of the technical assistance task for the 2010 Fiscal Year.



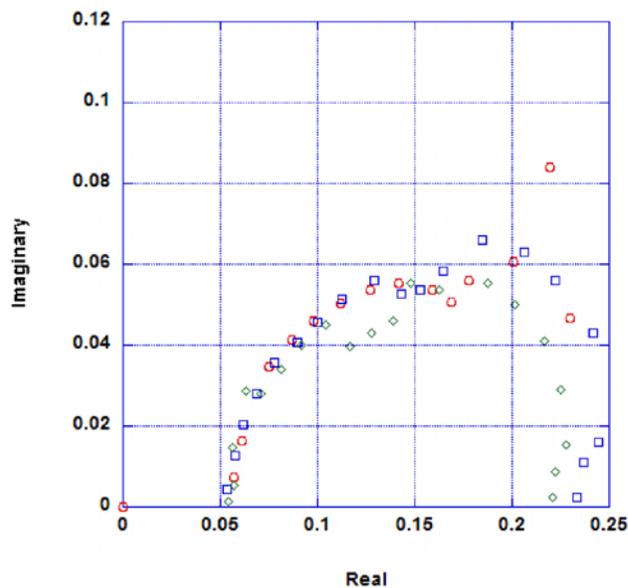
**FIGURE 1.** Hardware designed at LANL, to provide National Institute of Standards and Technology (NIST) beam line scientists (Hussey and Jacobson) support in conducting beam hardening experiments.



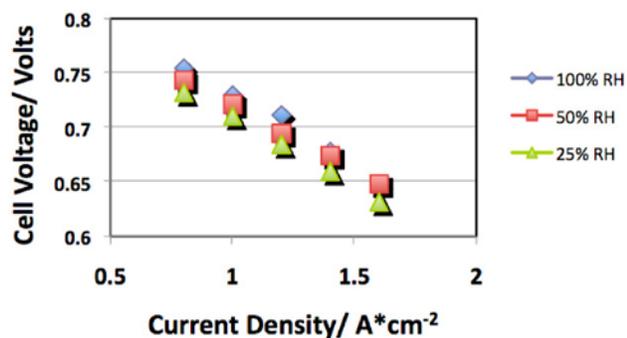
**FIGURE 3.** Cyclic voltammetry was run on a sample provide by NIST before running subsequent experiments such as hydrogen crossover measurements, break-in procedure, and polarization curves.



**FIGURE 2.** Los Alamos measured water profiles and performance of dead-ended anode to help University of Michigan develop and validate simple control oriented models and simulate the dynamics of large fuel cell stack systems operating with a dead-ended anode, which do not rely on anode humidification or re-circulation systems.



**FIGURE 4.** Impedance spectra runs on an operating fuel cell measured by LANL for the NIST Metrology group.



**FIGURE 5.** LANL's fuel cell testing capabilities as a function of relative humidity (RH) are highlighted in the voltage-current curve.

### FY 2010 Publications/Presentations

1. NRC-LANL-DOE Meeting, Golden, CO, March 2010.
2. Zelenay, Piotr, Advanced Cathode Catalysts, FreedomCAR Tech Team Update, Detroit, MI, February 2010.
3. Mukundan, Rangachary, Accelerated Stress Testing, FreedomCAR Tech Team Update, Detroit, MI, January 2010.
4. Brosha, Eric, Engineered Nano-scale Ceramic Supports for PEM Fuel Cells, FreedomCAR Tech Team Update, Detroit, MI, May 2010.