

## VII.C.10 Tungsten Cathode Catalyst for PEMFC

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*Contract Number: DE-FG36-05GO85042*

*Start Date: February 1, 2005*

*Projected End Date: December 30, 2005*

### **Objectives**

- Evaluate current catalyst in cathode application.
- Optimize catalyst synthesis to achieve an activity improvement towards attaining the DOE technical target for non-platinum catalysts.
- Demonstrate performance at initial operation, at 250 hours, and over 1,000 hours.

### **Technical Barriers**

This project addresses the following technical barriers from the Fuel Cells section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- B. Cost

### **Technical Targets**

#### Non-platinum Catalyst:

This project is conducting fundamental and applied studies of tungsten cathode catalysts. Insights gained from these studies will be applied toward the design and synthesis of catalyst materials that meet the DOE 2010 electrocatalyst targets, specifically activity, cost, and durability.

### **Approach**

This project, which has just started, focuses on optimization of an all-tungsten electrocatalyst previously discovered and verified as active for anode and cathode application. In cathode operation, activity falls below the status reported in the DOE Multi-Year Research, Development and Demonstration Plan for non-Pt catalyst activity. By better understanding the activation process and its products, new precursor materials and activation procedures are likely to provide a major improvement over the initial work.

This project focuses on optimization of four key areas relating to the synthesis of a tungsten catalyst for fuel cell applications. These areas define four technical tasks:

- Task 1: Optimize activation conditions

- Task 2: Optimize precursor composition
- Task 3: Optimize precursor loading on carbon
- Task 4: Optimize ink formulation

### **Accomplishments**

The project team is working initially on Tasks 1 and 3, where the greatest improvement is expected at this time.

- Completed initial demonstration of 2,000 hrs operating life.
- Initial study of surface chemistry of carbon supports and interaction with tungsten precursors completed.

### **Patents**

1. Christian, Joel B., Robert G. Mendenhall, U.S. Patent 6,656,870 (12/2/2003)

