Objectives

- Develop laser-induced breakdown spectroscopy (LIBS) to detect and characterize nanoparticles of the platinum group elements (PGEs).
- Use LIBS to quantify nanoparticles of PGEs in proton exchange membrane fuel cells (PEMFCs) filters and membranes.

Technical Barriers

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

(A) Durability
(C) Performance
(G) Startup and Shutdown Time and Energy/Transient Operation

Technical Targets

The technology developed by this project to detect and characterize emissions of PGE nanoparticles will support the following DOE 2011 Technical Target (Table 3.4.4).

Accomplishments

- The project is just getting started. The laser system and spectrometer have been ordered.
- The particle generator components have been ordered.

Approach

The approach taken is to develop the established and proven technology of LIBS specifically to study PGE-particulate emission from fuel cells. This direct approach will result in a versatile, sensitive, real-time, and potentially in situ diagnostic technique to evaluate PEMFC particulate emissions.

Results

Since the project is just beginning, there are no results to report at this time.

Conclusions and Future Directions

During FY 2007, major research equipment was ordered and is awaiting arrival. Tasks to be accomplished during the remainder of FY 2007 are:

- By August, the construction of the particle generator and set-up of the LIBS experimental arrangement will be completed. Also, calibration the LIBS signal using known PGE standards will begin.
- By September, complete the calibration phase of the project by establishing the relationship between PGE particle mass flow rate in the aerosol stream and the intensity of LIBS signals.
- After installation on the MSU-Billings campus of the fuel cell units in early fall, begin LIBS experiments to analyze PGE particulates in membranes and filters from operating fuel cells.

References