PROJECT SUMMARY/ABSTRACT

Applicant: Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

Principal Investigator: Dr. Douglas Bennett
Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

Project Title: Development of ITM Oxygen Technology for Low-Cost and Low-Emission Gasification and Other Industrial Applications

Project Objectives: Building upon the work of a previous DOE Cooperative Agreement, the primary objective of the proposed work is to advance the ITM Oxygen technology further along the path toward execution of the ITM Oxygen Development Facility (ODF), a nominal 2000 TPD demonstration-scale test unit. With additional work in engineering development and module fabrication, the completion of the proposed work scope will position the ITM Oxygen technology and team to begin execution of the ITM ODF project as early as 2017 for start-up by mid-2019.

This project extends and refines the previous work and focuses on materials development, ceramic processing and engineering development, validated by manufacturing trials and performance testing, toward the goal of beginning to execute the ITM ODF project as early as 2017. Specific improvements in materials to enhance membrane module reliability and performance, as well as in ceramic processing and wafer/module architecture, will be developed and evaluated with prototype and commercial-scale processing equipment at Ceramatec, Inc. and at the Ceramic Membrane Module Fabrication Facility (the "CerFab") in Tooele, Utah, respectively. Engineering development will concentrate on 1) heat exchange and ITM vessel design specifically for large-scale applications, and 2) contaminant mitigation to reduce process complexity and ensure long operating life for ITM modules. Testing of advancements in all areas at laboratory, prototype, and pilot scales (in the Intermediate-Scale Test Unit, or "ISTU") will reduce the technical risk and thereby lower the cost of the ITM ODF. Process development work, including a process economics study for a low-carbon-emission coal-to-liquid fuels process, will be carried out to assess the cost and environmental benefits of ITM technology in clean power and other energy-intensive domestic applications.

As part of this project, Air Products will collaborate with Ceramatec, Inc. for ceramic processing development; with Pennsylvania State University for high-temperature materials characterization; and with WorleyParsons for process simulation and costing. Air Products and Ceramatec will jointly operate the CerFab, currently under construction with Recovery Act funding, toward the goal of increasing its manufacturing efficiency in anticipation of eventual production for the ITM ODF and other commercial applications. Long-term, the CerFab is expected to support a number of U.S. manufacturing jobs, serving domestic and global applications that utilize ITM Oxygen technology by producing membrane modules that reduce costs of oxygen production for energy-intensive industrial and power plant applications.