

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

LOW-COST, MULTI-LAYER FABRICATION METHOD FOR SOLID OXIDE FUEL CELLS

PRIMARY PROJECT PARTNER

Technology Management, Inc.,
Cleveland, Ohio

TOTAL ESTIMATED COST

\$167,473

COST SHARING

DOE	\$133,978
Non-DOE	\$33,495

CUSTOMER SERVICE

(800) 553-7681

STRATEGIC CENTER FOR NATURAL GAS WEBSITE

www.netl.doe.gov/scng

Description

Technology Management, Inc., working toward introducing fuel cell power-generation technology on a global scale, will develop and implement a multi-layer screen-printing technique facilitating rapid, low-cost fabrication of complete solid oxide fuel cells (SOFCs) for bundling into stacks and systems. This work involves gas distribution manifolds, seals, current distribution layers, and electrochemical components with minimal waste products. Pigments supported in polymer matrix vehicles have been developed and used for decades in paint and automotive coating applications. TMI believes this base of information can serve as a platform and a model for advanced fuel cell manufacturing. By combining catalyzed ink vehicles with traditional SOFC materials, the resulting products can be used to build-up the manifold, sealing, current distribution, and electrochemically active layers directly onto a typical YSZ electrolyte. Improvements in performance, life, and efficiency are all possible with minimal increase in device complexity. The ability to produce the TMI SOFC at low unit cost is critical to achieving long-term success in all fuel cell markets.

Goal

The proposed research will identify and implement a rapid cure polymer ink vehicle to accelerate multi-layer screen-printing of thick layers onto SOFCs. Once identified, the polymer system will be implemented on a commercial screen printer to complete multi-pass printing operations, and to demonstrate the technical feasibility of using this technique commercially.

Benefits

Manufacturing costs are barriers to fuel cell commercialization, particularly in solid oxide fuel cells, where high initial costs are sometimes required to begin scale manufacturing. By adapting an existing compatible technology, capital costs can be minimized and earlier economies of scale can be realized. Implementation of fuel cell power has the potential to significantly impact on the cost of electricity, particularly in poorly served but potentially important niche markets.



LOW-COST, MULTI-LAYER FABRICATION METHOD FOR SOLID OXIDE FUEL CELLS

CONTACT POINTS

Tom J. George, P.E.
National Energy Technology
Laboratory
(304) 285-4825
tom.george@netl.doe.gov

Dr. Christopher Milliken
Technology Management, Inc.
(216) 586-4498
milliken@stratos.net

Milestones

Multi-layer screen printing techniques are widely used in other industries as low cost fabrication methods. They are particularly well suited to the flat plate geometry of the Technology Management Inc. (TMI) Solid Oxide Fuel Cell. A major challenge facing SOFCs is adapting that existing technology base to electrochemically active SOFC materials.

Preliminary Cost Studies	July 2000
Chemical Compatibility Tests	December 2000
Single Pass Printing	July 2001
3-Dimensional Printed Structures	March 2002

