High Performance Catalytic Heat Exchanger for SOFC Systems

Stephen Jolly, Hossein Ghezel-Ayagh
FuelCell Energy, Inc.

Jeroen Valensa
Modine Manufacturing Company

Project Objective
Demonstrate conceptual feasibility of a highly effective catalytic cathode air preheater for a 300kW SOFC power plant to increase plant performance and to reduce the balance of plant cost.

Team Partners
FuelCell Energy, Inc.
Darby, CT

BASF Catalysts
Iselin, New Jersey

Project Background
• In addition to SOFC cell/stack performance, cost, and durability improvements – innovative technologies for reducing balance-of-plant (BOP) component costs are required for successful commercial deployment of SOFCs in distributed generation applications.

Material of Construction Selection
Key Material Selection Criteria:
• Oxidation Resistance
• Suitability for catalyst washcoating
• Joining via conventional methods
• Resistance to Chromium evaporation
• Acceptable creep strength
• Availability
• Cost

Typical SOFC-based System

BOP Capital Equipment Cost Breakdown

30-40% Component Cost Reduction Targeted

Conceptual Catalytic Heat Exchanger Design for 300kW SOFC Power Plant

Conventional non-Catalytic Heat Exchanger

Catalytic Heat Exchanger

Fabrication and Testing of Lab-Scale Catalytic Heat Exchanger

Photograph of a Catalytic Heat Exchanger Developed by Modine/BASF for H₂ Production from Natural Gas

PCE’s Anode Gas Oxidizer Test Facility

This material is based upon work supported by the Department of Energy under Award Number DE-SC0002522.