

Matrix Study of Aged SOFC Performance and Materials Degradation

Project FE0026095

Acumentrics SOFC, Boston University Program Manager: Joe Stoffa



Problem statement

Commercial viability of fuel cells requires

Acceptance in widespread markets

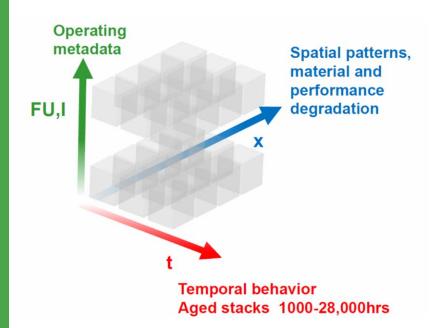
- Customer requirements
 - Superior performance
 - Long service life
 - High reliability
 - Low capital outlay

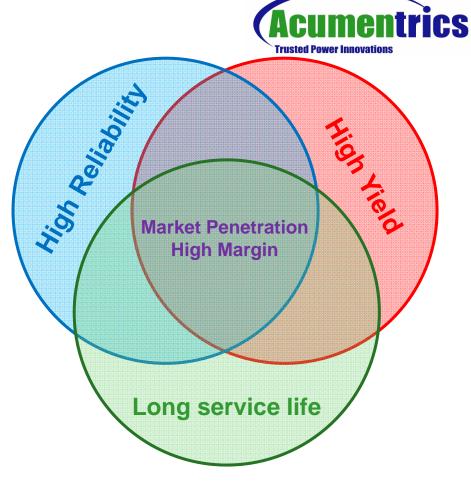
Inexpensive SOFC product

- Production requirements
 - Low materials cost
 - High yield
 - High throughput

Project Statement

Matrix Study of Aged SOFC Performance and Materials Degradation





- Degradation behavior
 - Degradation mechanism
 - Cell manufacturing improvement



Acumentrics SOFC, Inc

- SOFC division established in 2000, "Powder to Power" in single facility in Westwood, MA
- Focus on "rugged" fuel cells, pioneered small tubular SOFC;
 - 30 min startup and shutdown
 - Unattended operation in remote locations with >25,000hrs
- PRODUCTS
 - 250W-10kW products,
 - 250-1500 W commercial power products (NG, APG, LPG) with - 500 MW-hr
 - 3kW and 10kW development products (biofuel, diesel, JP8) for the US military
- FUELS and APPLICATIONS
 - Natural gas, LPG, JP8, biofuel
 - Critical remote power
 - Units all utilize remote monitoring for additional reliability

Remote Power Application



- US Coast Guard Radio
 Network Towers in Alaska
- LPG flown in by helicopter; fuel efficiency highly desirable







Remote LPG and NG Applications



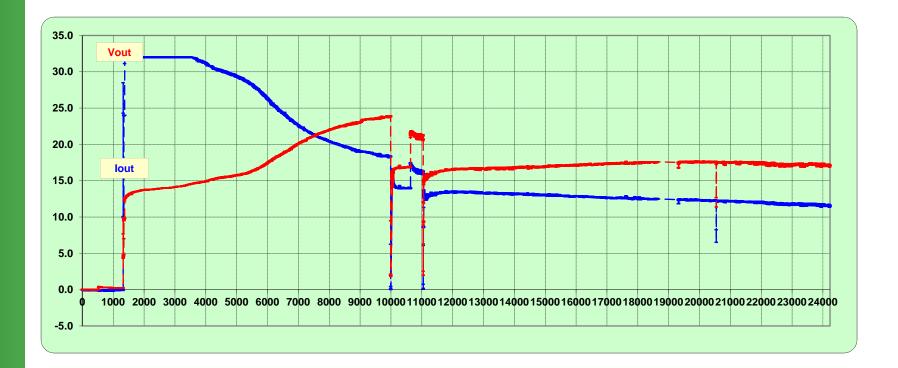








Commercial SOFC in a Remote Power Application



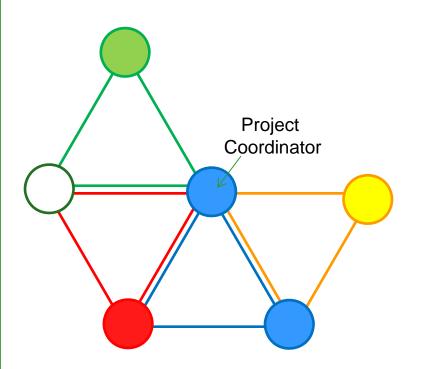
İCS

Hourly averaged data of the voltage and current output from a field unit.



Team Arrangement

- NDA between Acumentrics and BU is already in place
- Teams will transfer technical information on a bi-weekly basis





NETL Manager Joe Stoffa



Boston University Professor Gopalan's group





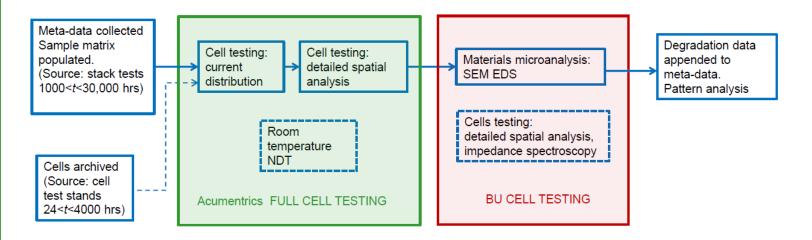
Acumentrics PIs Neil Fernandes, Shawn Ji

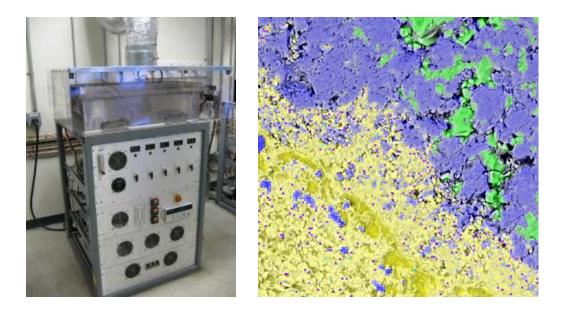


Acumentrics SOFC



Project Overview





Prof. Gopalan's Group at Boston University



Impendence test capability

In-situ high temperature measurement

Microstructure analysis capability

- SEM/EDX
- FIB/FESEM
- XPS
- AES
- Access to facilities in other institutions
- There will be one student dedicated to this project with appropriate training



Project Schedule

ID	Task Name		Quarter 1			Quarter 2			r 3	Qua	Quarter 4			Quarter 5		Quarter 6		Quarte
		Sep	Oct 1	Nov Dec	Jan	n Feb	Mar	Apr	May Ju	n Ju	Aug	Sep	Oct	Nov E	Dec	Jan I	Feb Mar	Apr
2	Matrix Study of Aged SOFC Performance and Materials																	
	Degradation																	
3																		
4	Task 1.0 Project management and planning																	
5	Task 2.0 Survey of metadata and categorization of cells from aged stacks																	
6	Task 3.0 Electrochemical characterization of aged cells																	
7	Task 4.0 Application of NDT techniques for imaging defects in aged cells			I						<u> </u>								
8	Task 5.0 Materials characterization of aged cells														İ			
9	Task 6.0 Pattern analysis of accumulated data																	