

*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

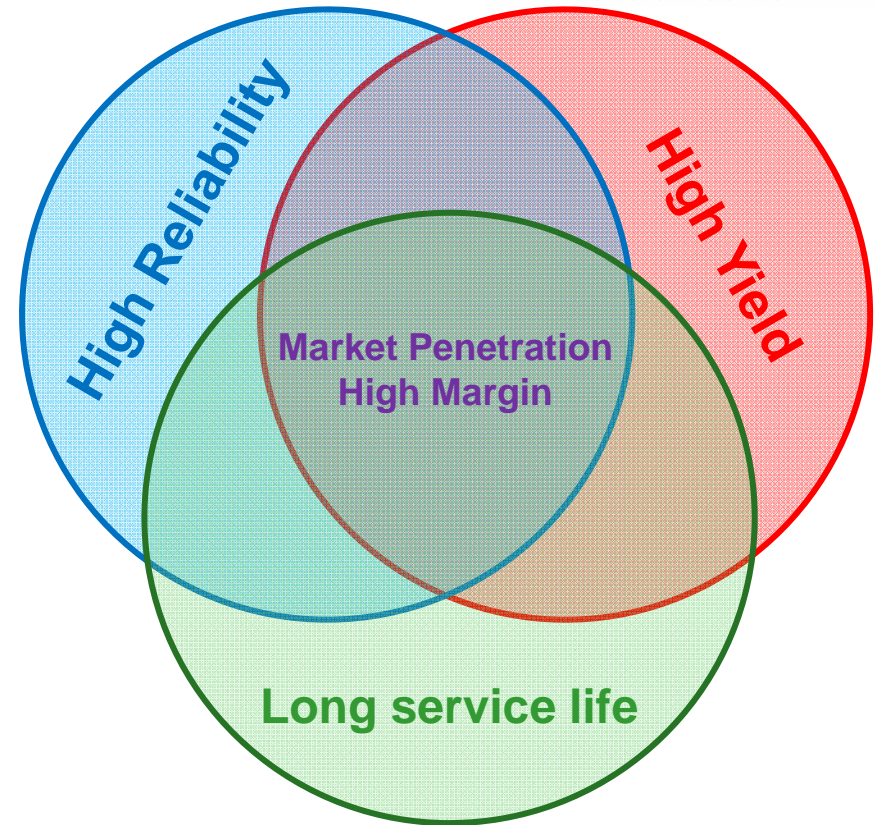
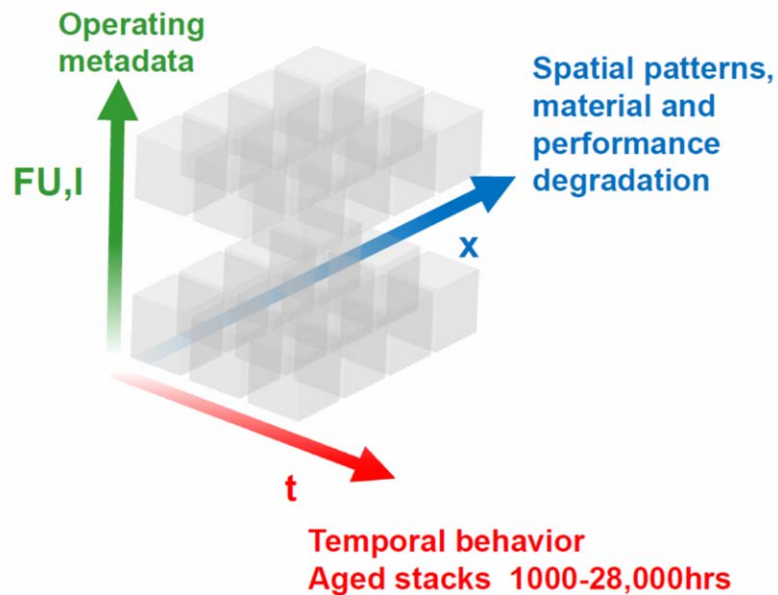
- Customer requirements
 - ▶ Superior performance
 - ▶ Long service life
 - ▶ High reliability
 - ▶ Low capital outlay

■ 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

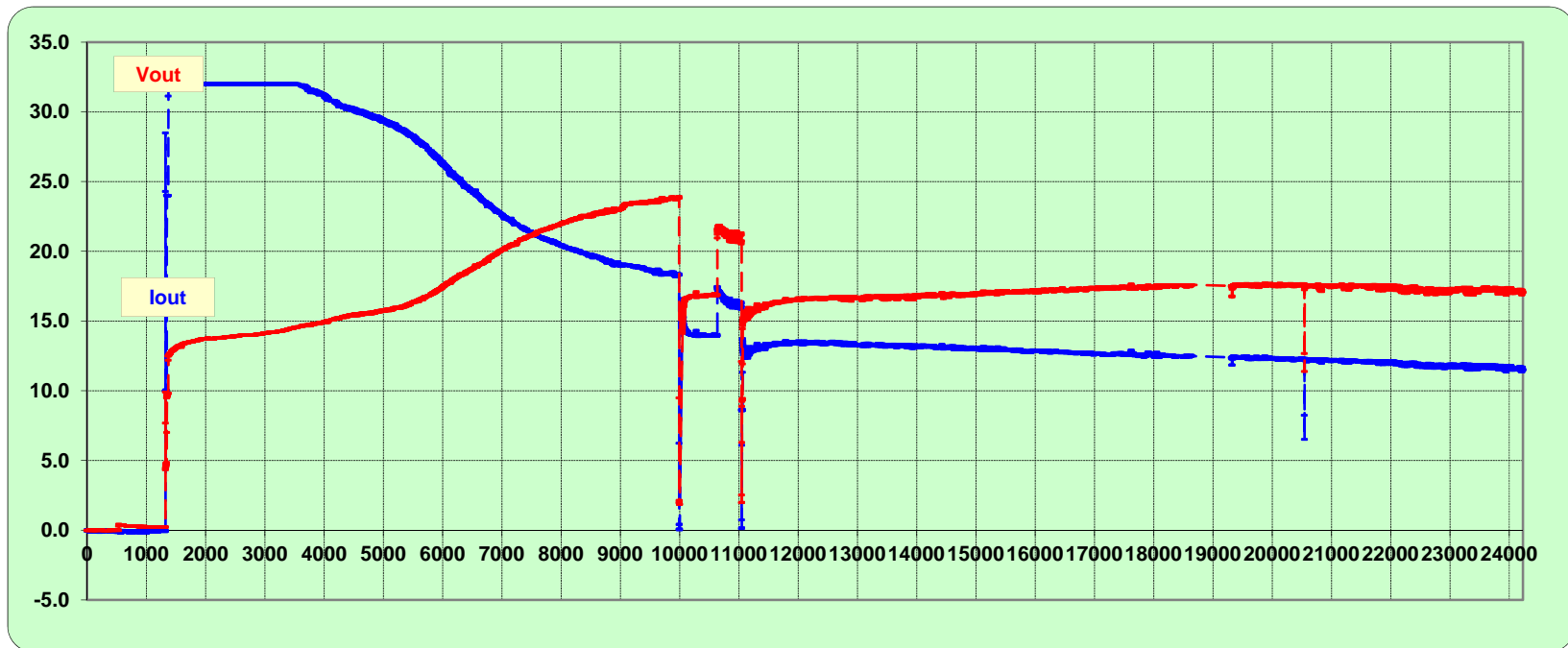
- US Coast Guard Radio Network Towers in Alaska
- LPG flown in by helicopter; fuel efficiency highly desirable



Remote LPG and NG Applications



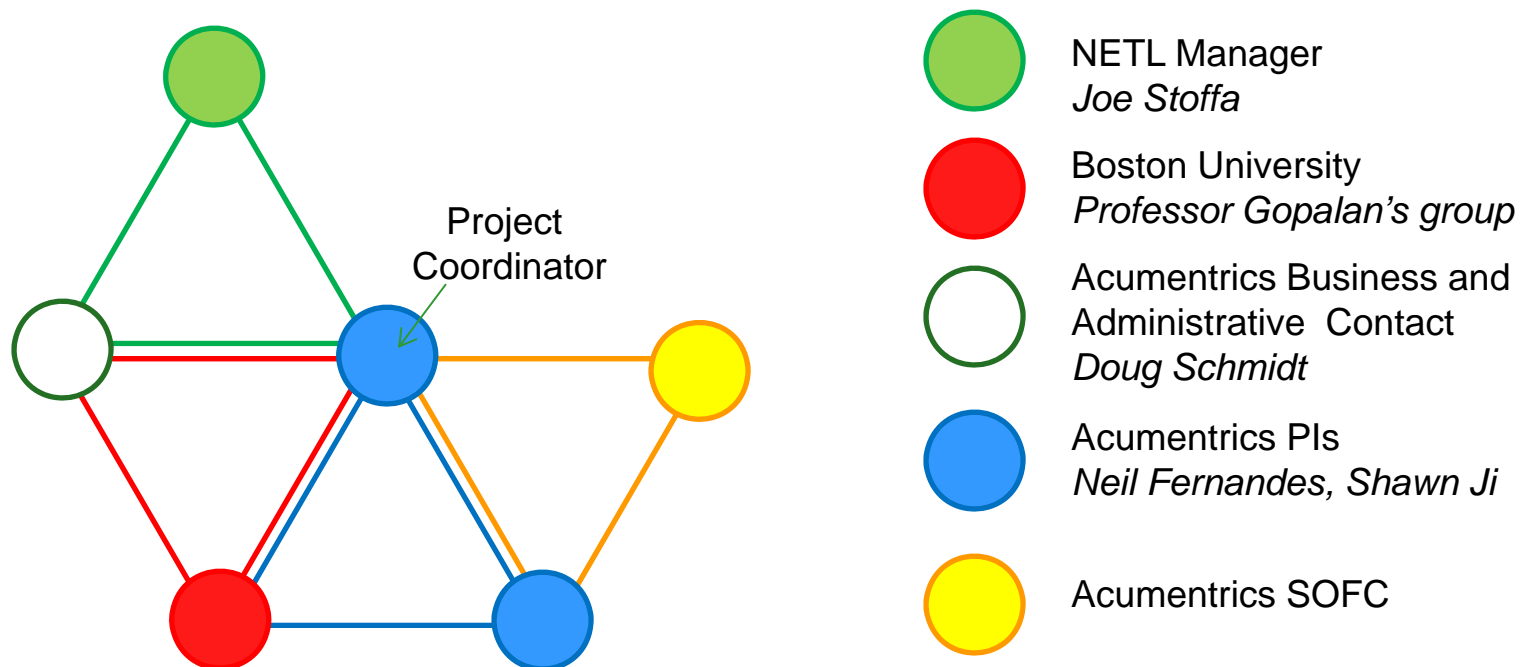
Commercial SOFC in a Remote Power Application



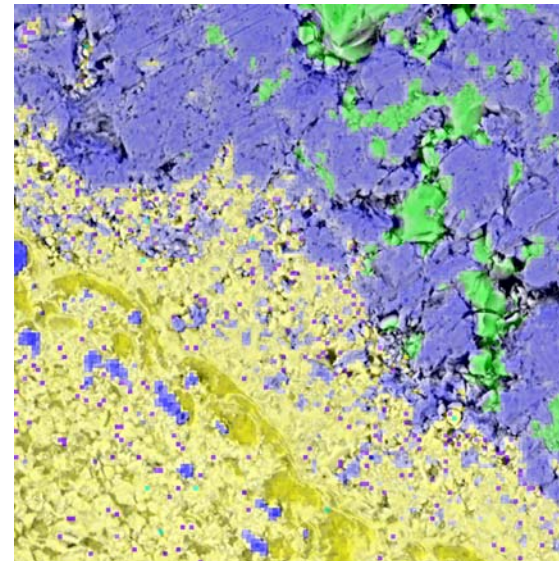
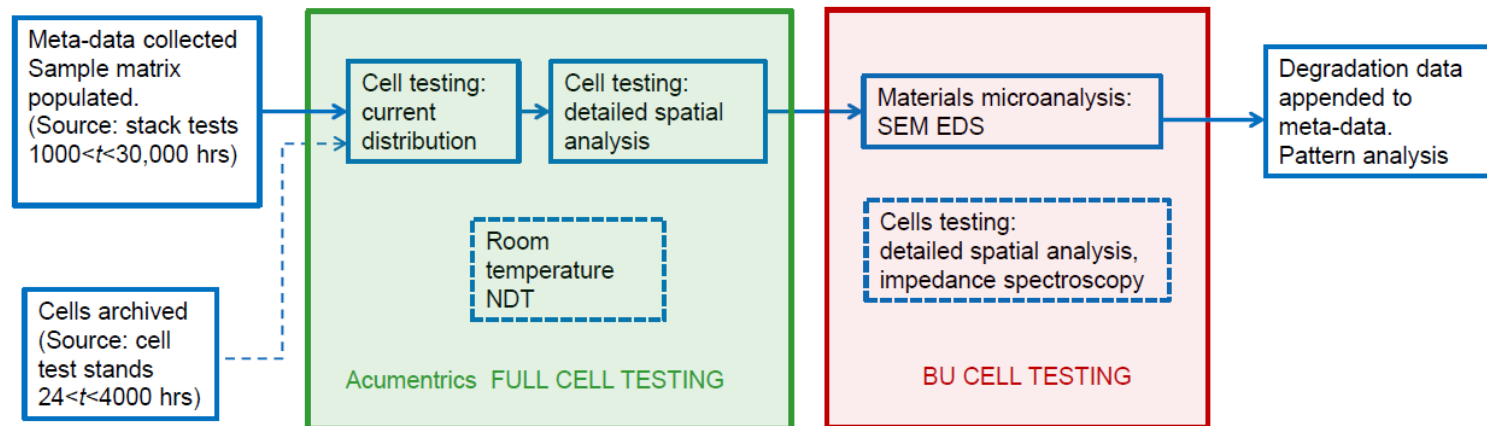
Hourly averaged data of the voltage and current output from a field unit.

Team Arrangement

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



Project Overview



Prof. Gopalan's Group at Boston University



- Impedence 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

