Bipolar Plate-Supported Solid Oxide Fuel Cell

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Objective

SOFC for Auxiliary Power Unit (APU) of Automotive Application

Our new concept addresses shortcomings of current SOFC designs

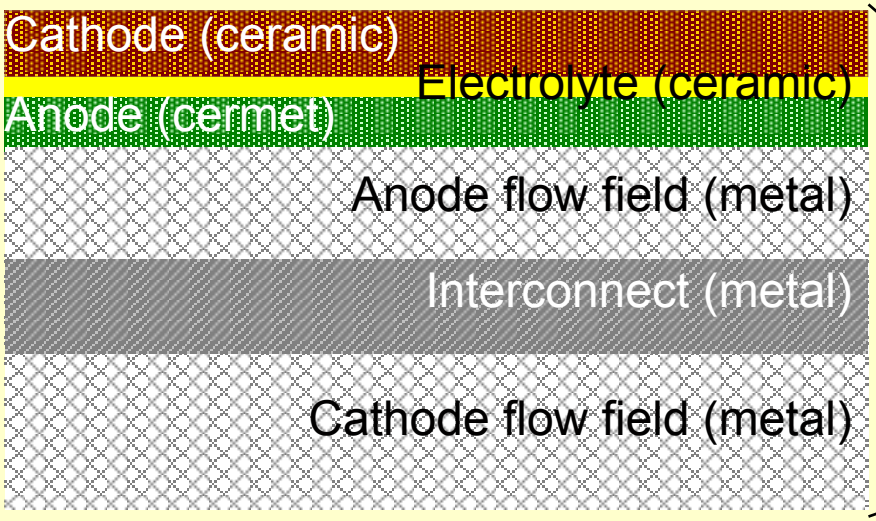
- **Advantages of SOFC for APUs**
  - High Power Density and Efficiency
  - Fuel Versatility
  - Highly Favorable Duty Cycle
- **Requirements for SOFC APUs**
  - Quick Start
  - Vibration and Shock Resistance
  - Low Cost

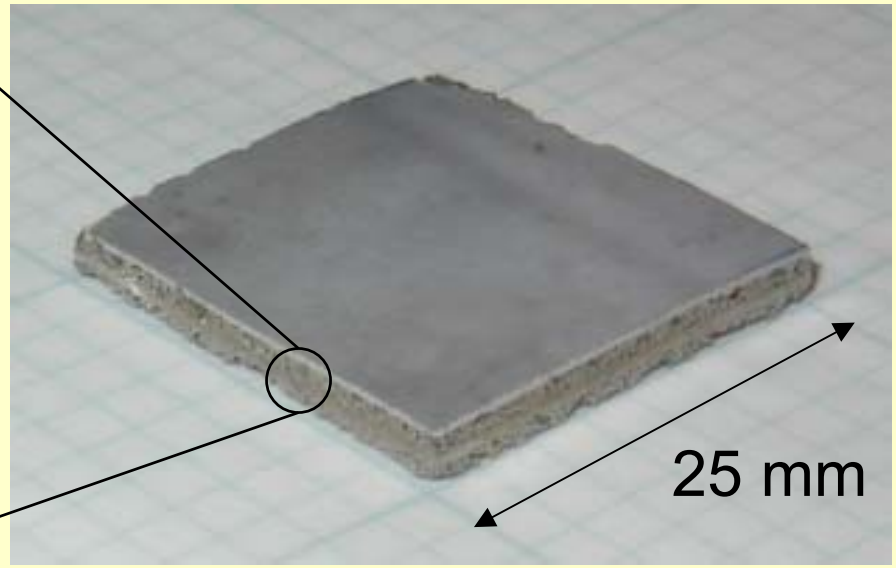
Approach

Argonne's new TuffCell SOFC concept meets the APU requirements

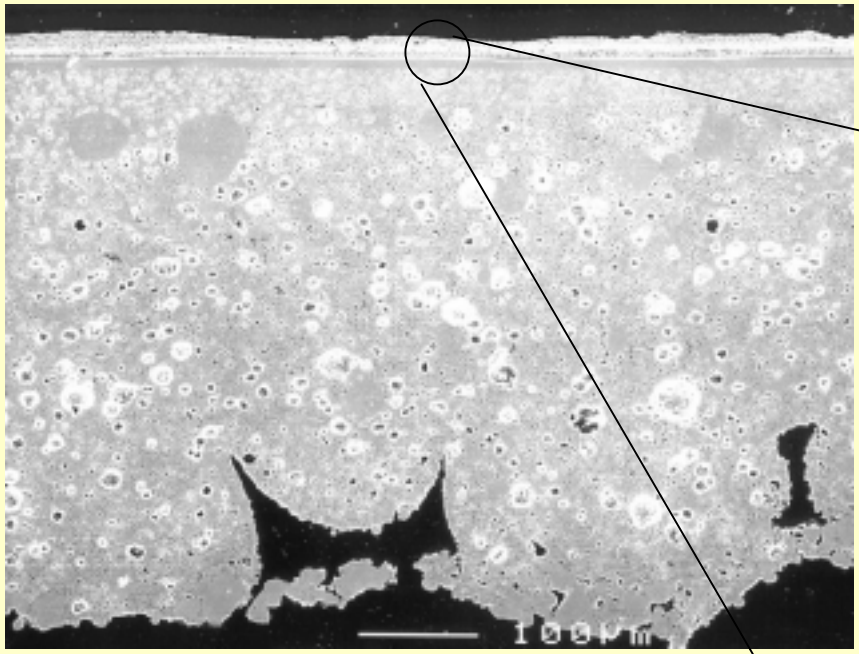
- Metal-supported design
- High mechanical strength
- Easy fabrication and cell stacking
- High performance
- Low cost

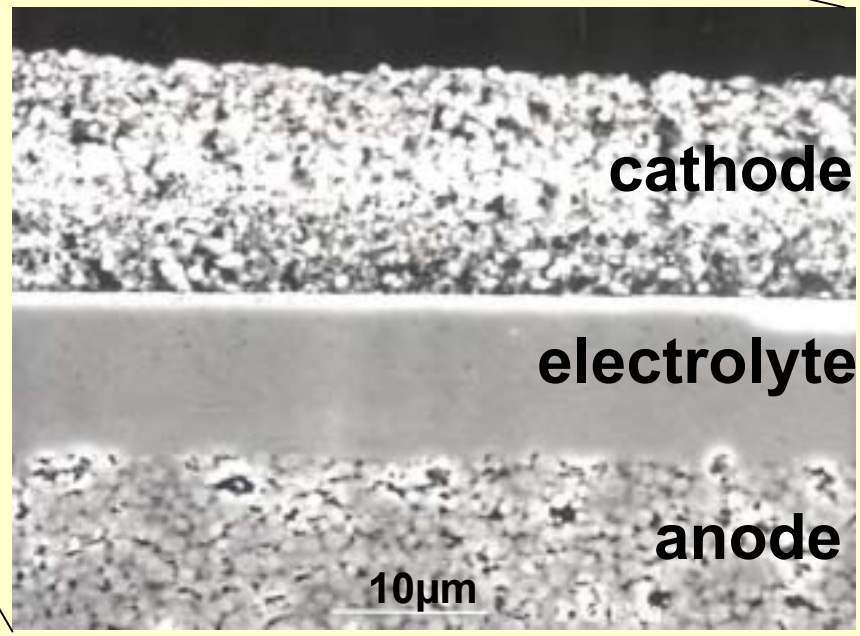
The Argonne TuffCell



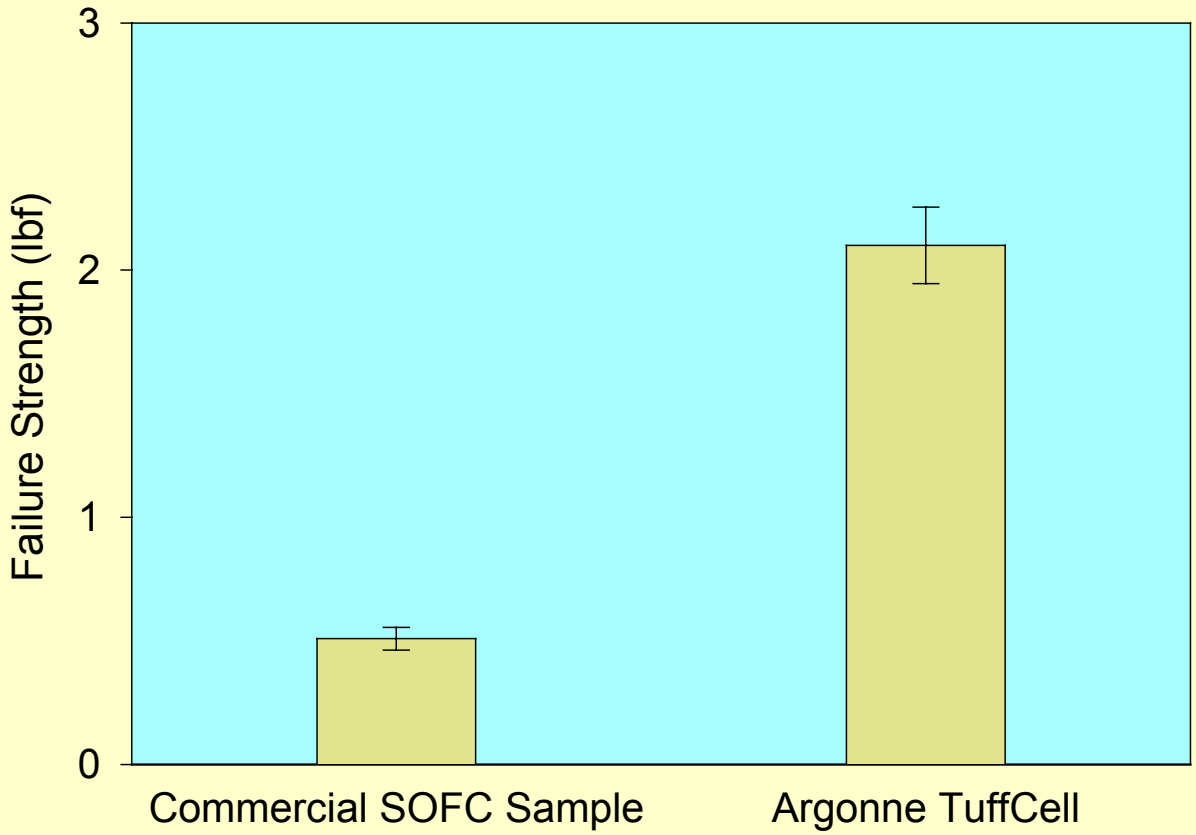


Microstructure of TuffCell

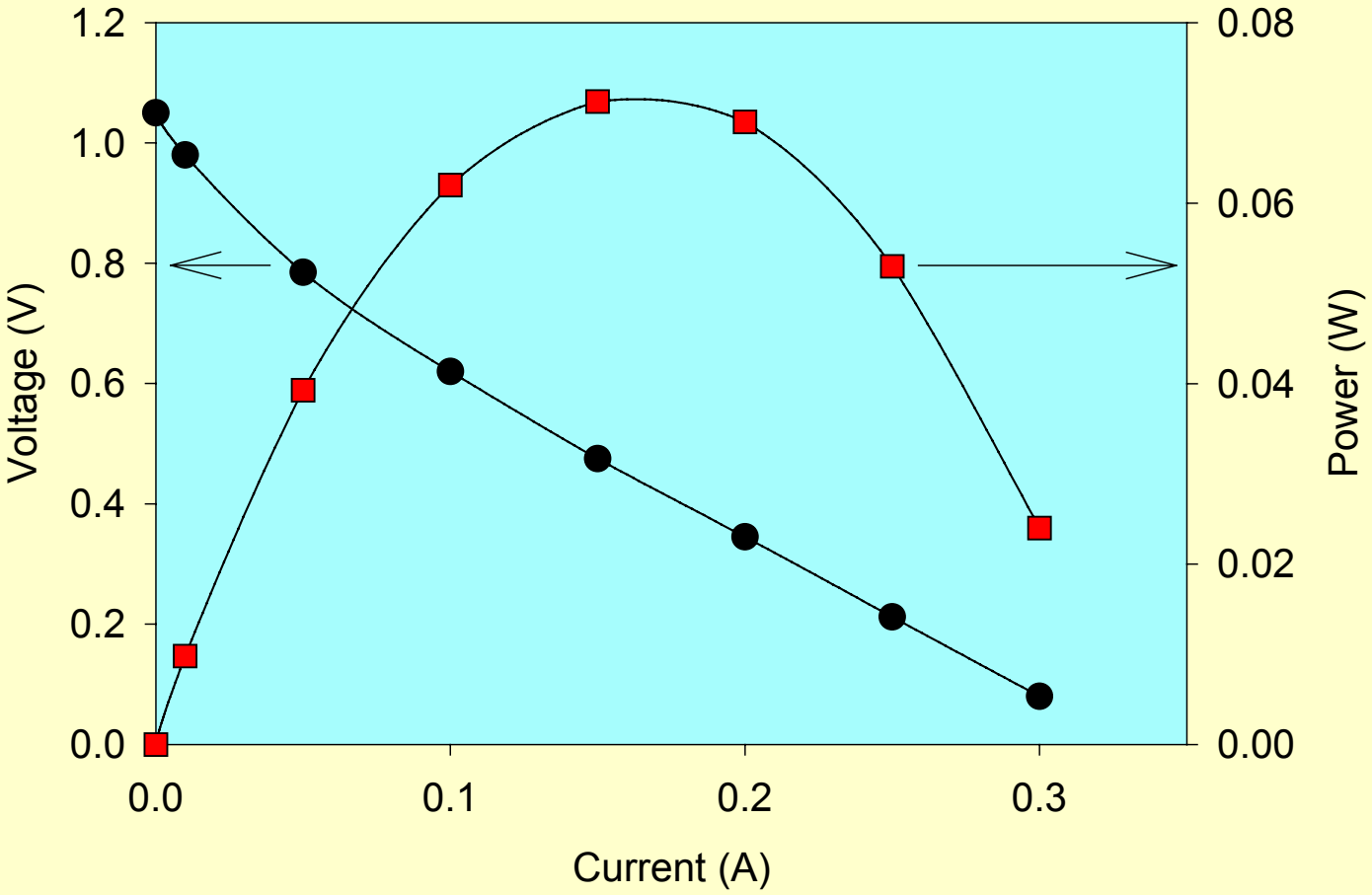




The TuffCell has High Strength



Preliminary Performance of TuffCell



Current Status of TuffCell

- New fabrication concept greatly reduces fabrication problems
- High mechanical strength has been confirmed
- Theoretical OCV (open circuit voltage) was obtained
- Performance improvements are on-going

Next Steps

- Increase performance to ≥ 0.3 W/cm²
- Scale up fabrication to ~100 cm²
- Conduct cycling tests between 25°C and 800°C
- Investigate different cell stacking concepts
- Verify performance on reformate