

Materials Development for SOFCs: Seals and Electrolytes

NexTech Materials, Ltd.

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MATERIALS

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Textured Composite Seal Materials

DOE Contract Number: DE-FG02-02ER83528—Phase II SBIR

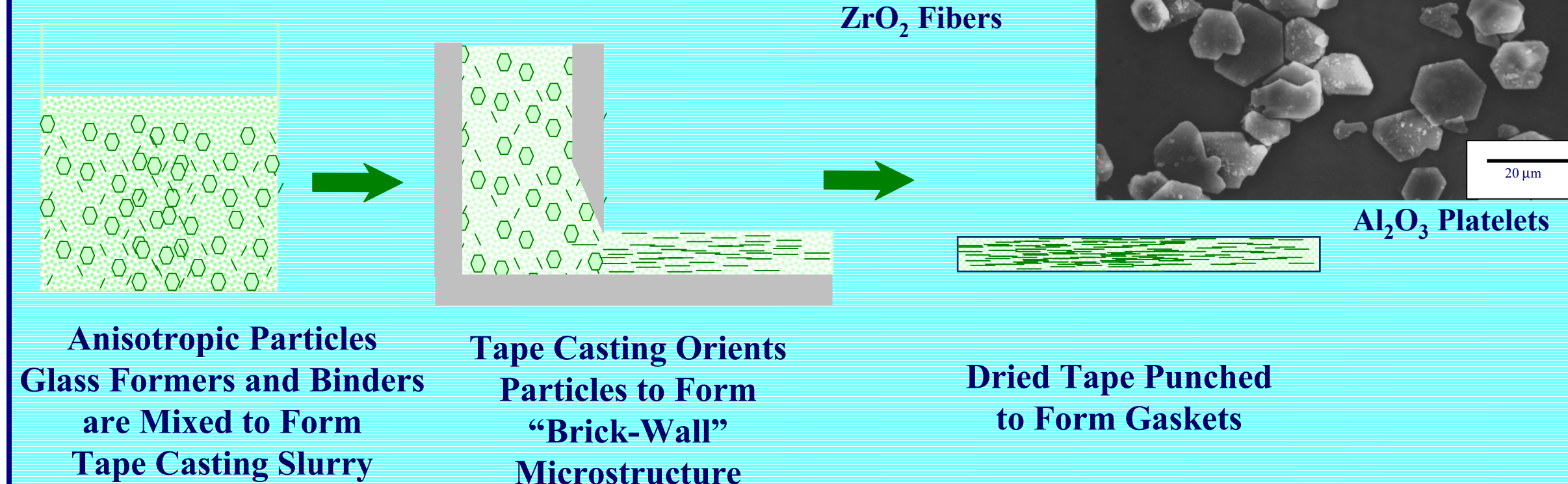
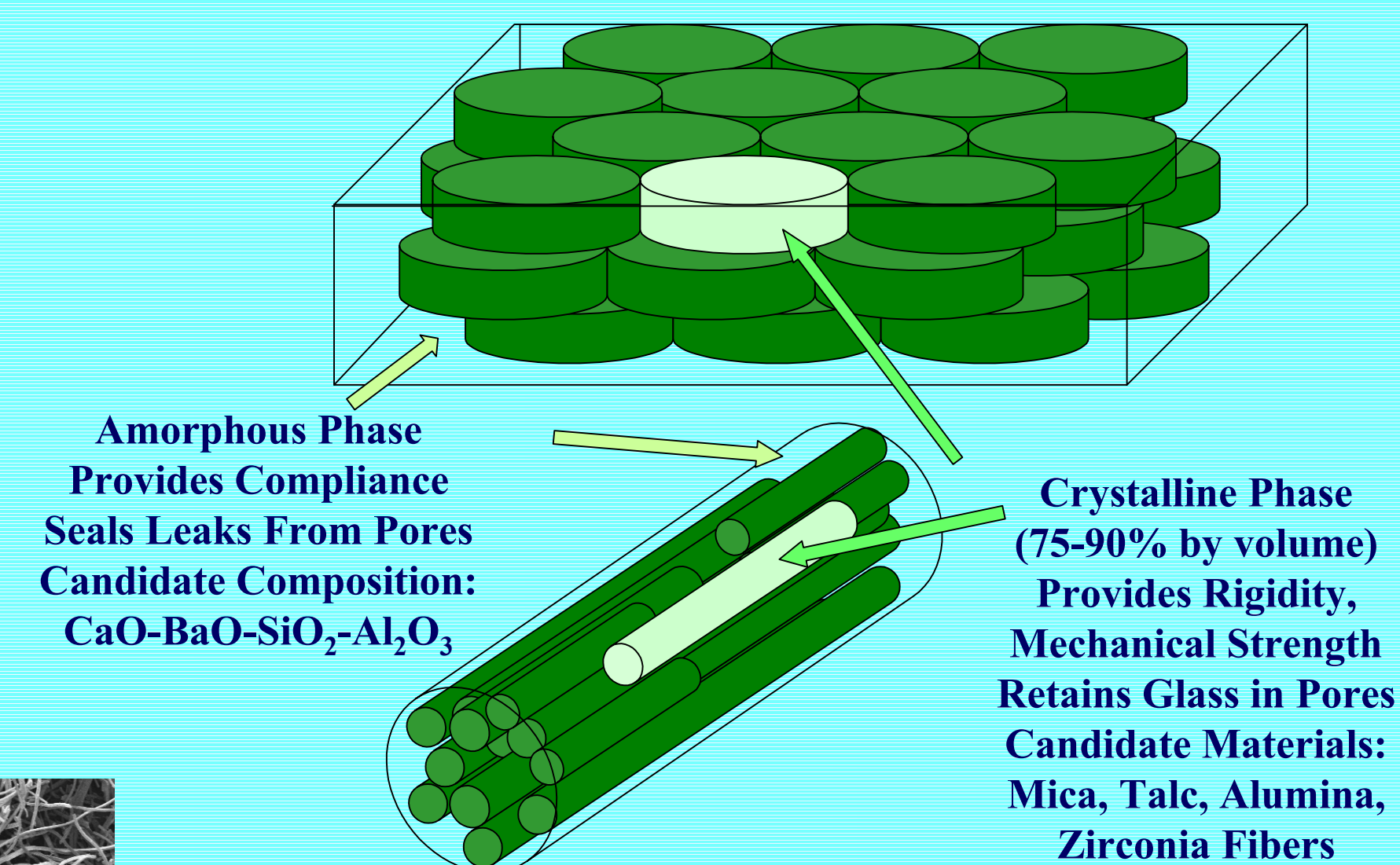
Objectives:

- Low Operating Temperature
 - $600^{\circ}\text{C} < T < 800^{\circ}\text{C}$
- Flexible Configuration
 - Compatible with SECA Stack Designs and Materials
- Thermally and Mechanically Robust
 - Able to Withstand Thermal Cycling
- Composite Approach
 - Tailoring Thermo-mechanical Properties
 - Chemical Compatibility

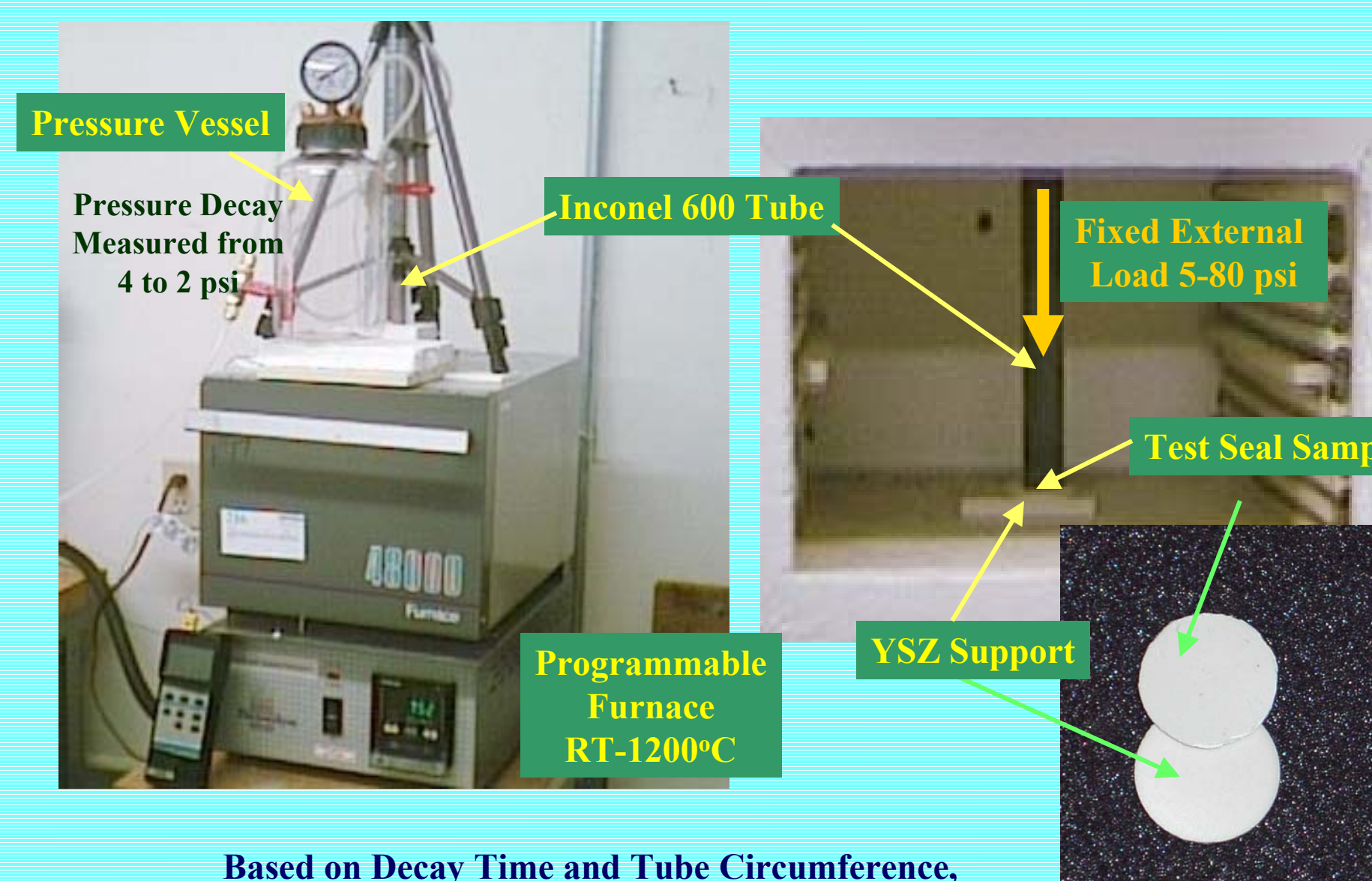
Technical Approach

- Tape Cast Seal Manufacturing
- Tailored Seal Geometry
 - Easily Shaped
 - Conformable Precursor Tape

Sealing Concept

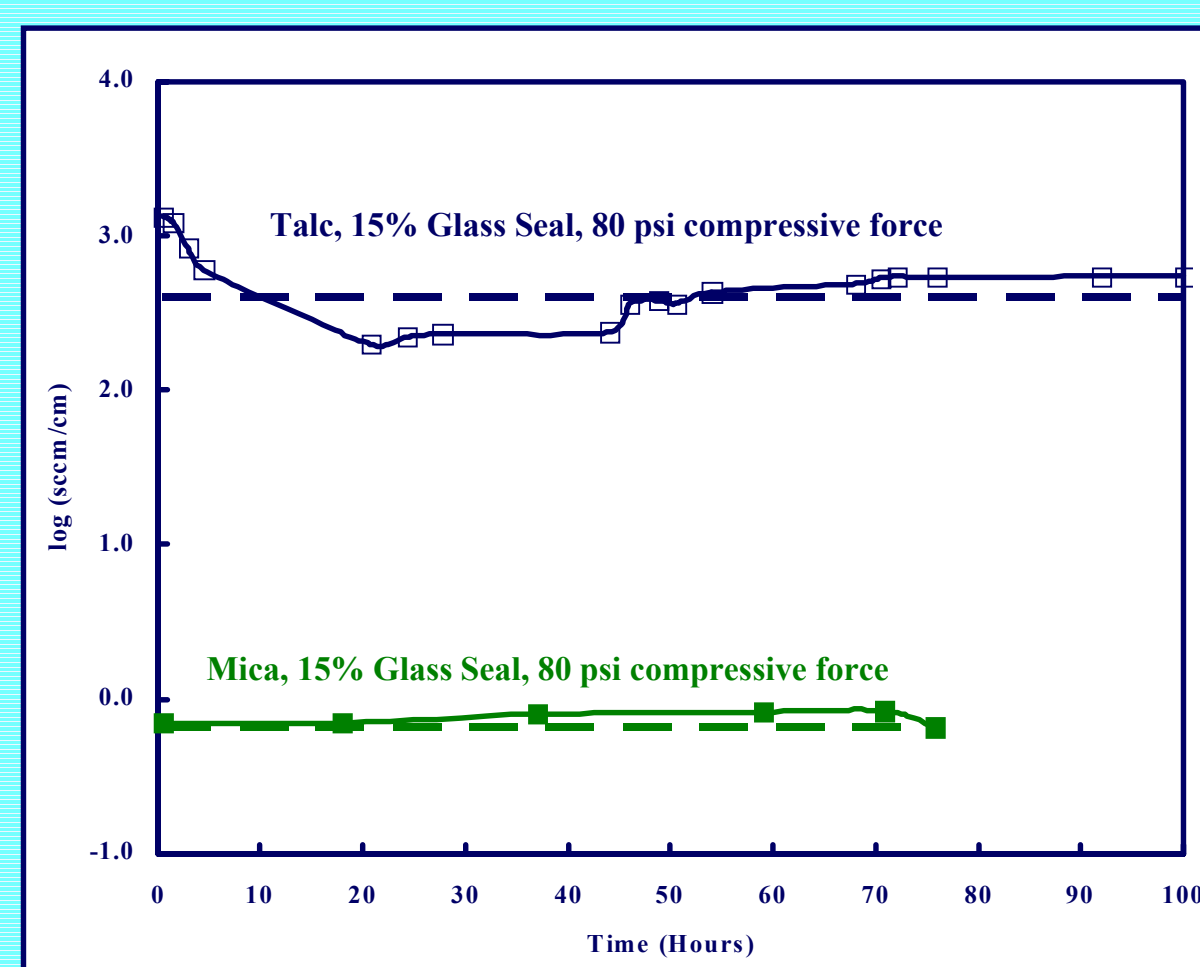
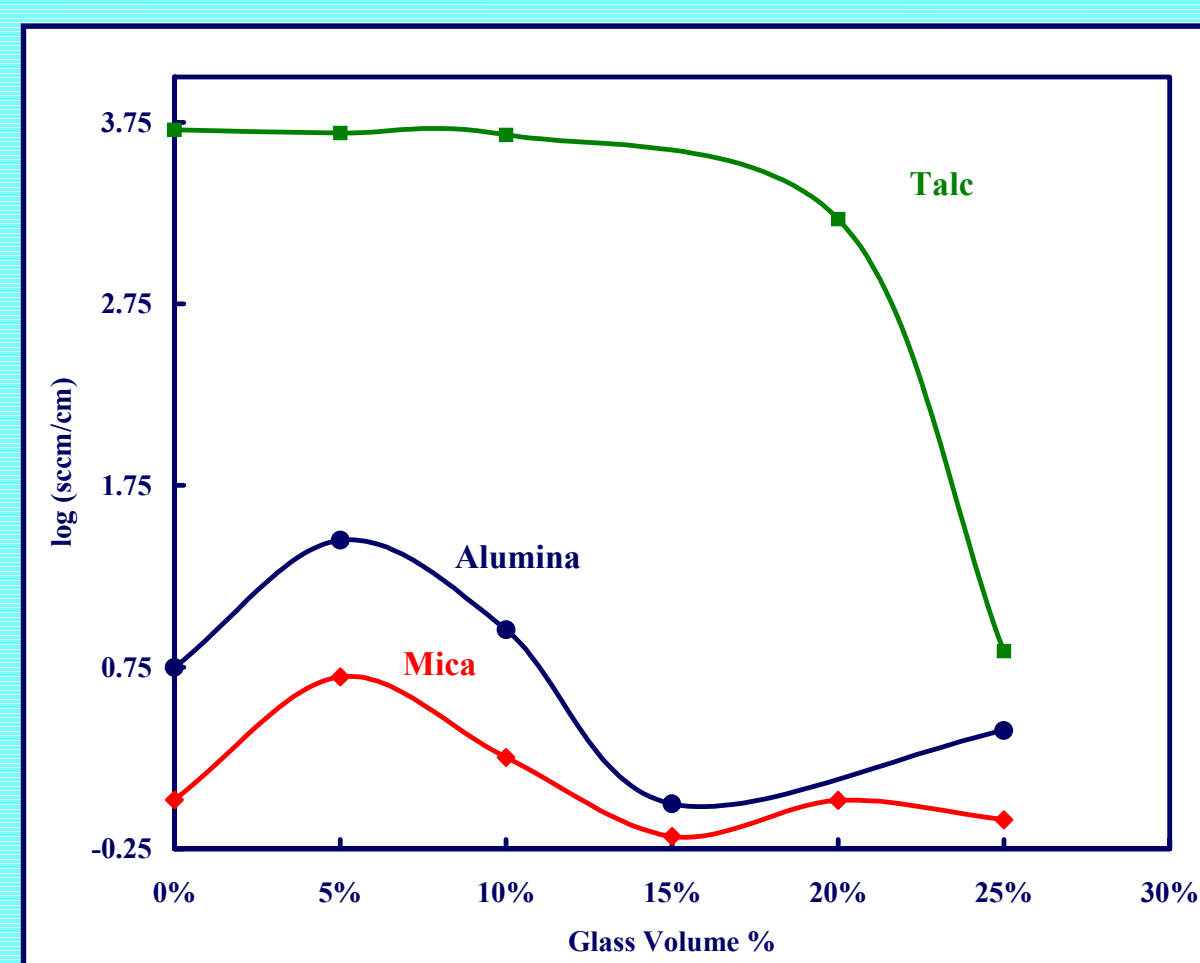


Phase I Seal Testing



Based on Decay Time and Tube Circumference, the Leak Rate/cm was calculated.

Phase I Seal Testing



Electrolyte Deposition via Aerosol Spray Co-Sintering of Thin Film Electrolytes

DOE Contract Number: DE-FG02-03ER83729—Phase I SBIR

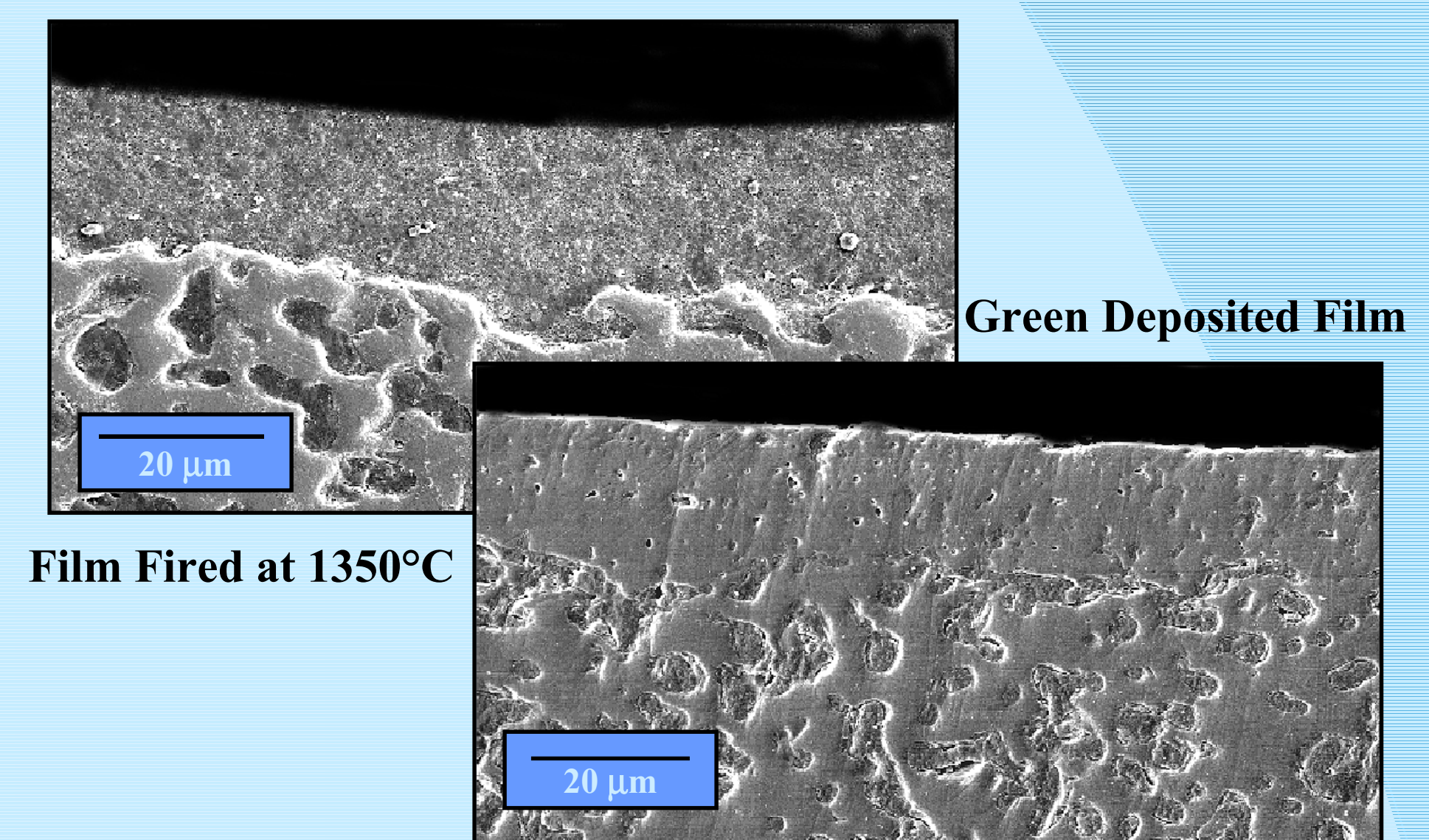
Objectives:

- Prepare Co-Sintered Electrolyte SOFCs
- Interfacial Layer to Allow High Temperature Sintering
 - Tailored Sinterability of Electrolyte Layer
- Demonstrate Electrolyte and Interfacial Layers
- Tailor Coating and Substrate Shrinkage
 - Tailor Interfacial Layer Porosity, Phase Distribution



Demonstration of Laboratory Scale Coating Deposition on Cathode Support Tubes

Co-sintered Electrolyte Deposited on Cathode Supports



Co-sintered Electrolyte Deposited on Planar Electrodes

