

# Low Cost, Durable Seal

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# LOW COST, DURABLE SEAL

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## Outline

- Project Objective
- Technical Approach
- Timeline
- Team Roles
- Budget
- Q&A

# LOW COST, DURABLE SEAL

## Project Objective

Develop advanced, low cost, durable seal materials and sealing techniques amenable to high volume manufacture of PEM cell stacks.

<b>DOE Targets/Goals/Objectives</b>	<b>Project Goal</b>
<u>Durability</u> Transportation: 5,000 hr Stationary: 40,000 hr	<u>Durability</u> Improve mechanical and chemical stability to achieve 40,000 hr of useful operating life.
<u>Low Cost</u>	<u>Low Cost</u> A material cost equivalent to or less than the cost of silicones in common use.

# LOW COST, DURABLE SEAL

## Project Approach - Background

### Material Choice:

Material Category	Stress Relaxation	Chemical Stability	Processing (Low Temp, Pressure)	Low Cost
LIM Silicones	-	-	+	+
Fluoropolymers	○	+	○	-
Existing Hydrocarbons	+	+	○	○
LIM Hydrocarbon	+	+	+	+

**+ Excellent**

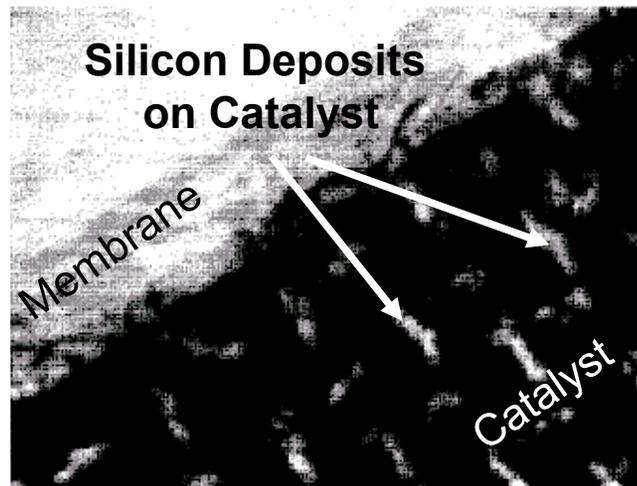
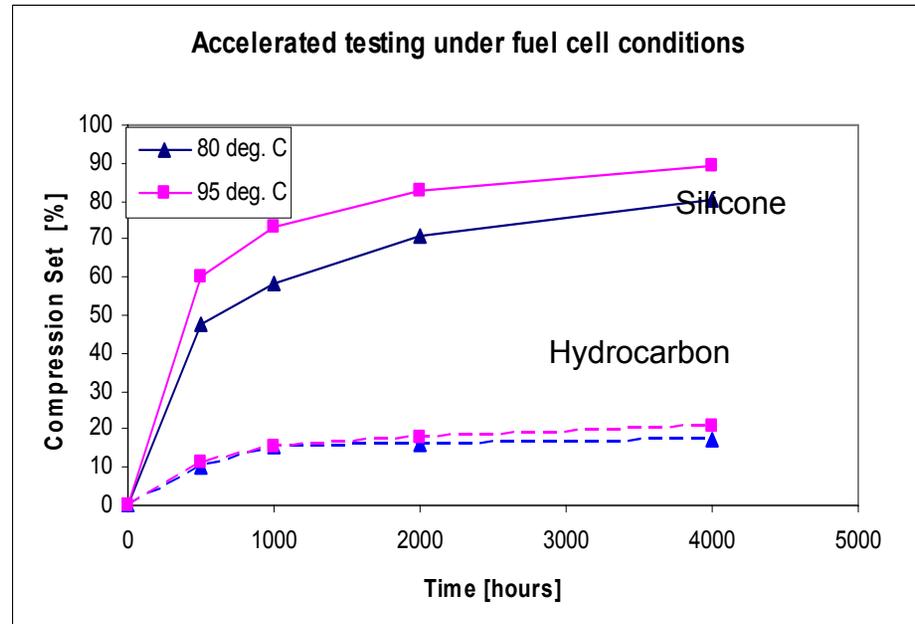
**○ Fair**

**- Poor**

# LOW COST, DURABLE SEAL

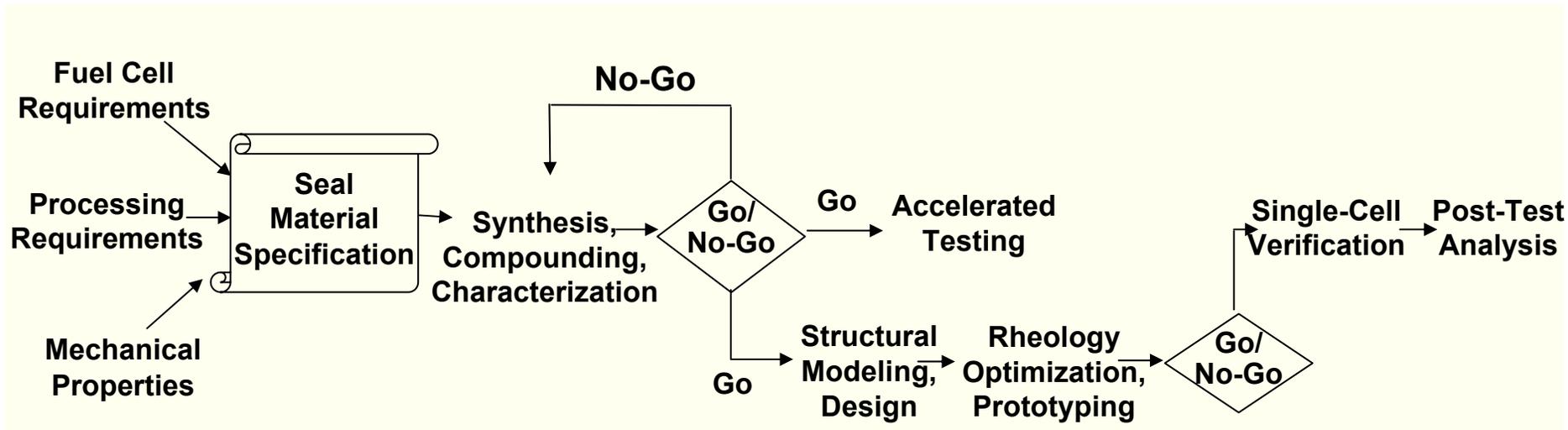
## Project Approach - Background

- Experience indicates hydrocarbon elastomers can retain load better than silicones in PEM environments
- Silicones are known to breakdown and migrate to adjacent fuel cell components potentially causing water and reactant and ionic transport issues.



# LOW COST, DURABLE SEAL

## Project Approach



Material Specification and Development

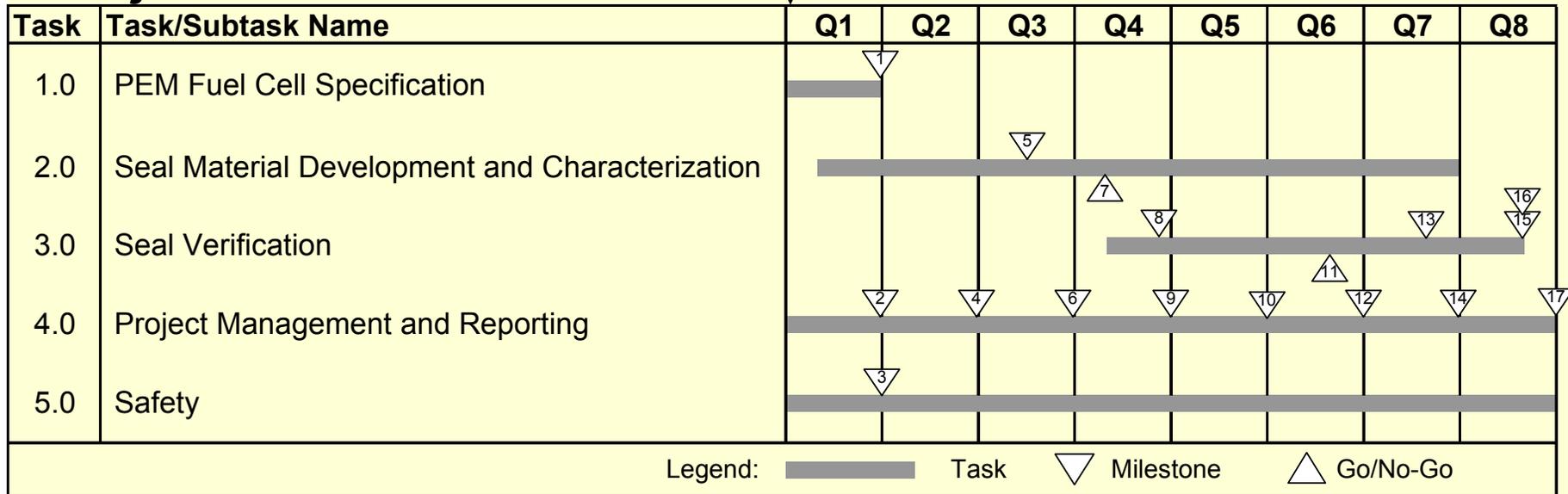
Seal Modeling and Prototyping

Single-Cell Verification

# LOW COST, DURABLE SEAL

## Project Timeline

Start Date: 4/01/07



M/S	Milestone
1	Complete Seal Specification
3	Complete Safety Plan
5	Complete 1 <sup>st</sup> Round Synthesis and Characterization
7	Complete 1 <sup>st</sup> Round Material Screening
8	Finalize seal design
11	Complete 1 <sup>st</sup> Round LIM prototype characterization
13	Begin single cell validation
15	Complete accelerated life testing and predict life
16	Complete single cell verification testing and analyses
17	Final Technical Report to DOE
2, 4, 6, 9, 10, 12, 14	Quarterly Progress Reports

# LOW COST, DURABLE SEAL

## Team Roles

### Qualifications

### Project Role



**Fuel Cell Experience:**



- Material specification
- Seal interactions
- Modeling
- Seal design
- Stack design



**Polymer Synthesis**



- Materials development, support and consulting



**Precision Molding**



- Seal concept evaluation
- Rapid prototyping
- Process development



**Material characterization**



- Material characterization
- Accelerated testing



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## Program Budget (total program)

GFY '07	\$1,427,717
GFY '08	\$1,530,088
GFY '09	\$341,925

Total: \$3,299,730

(includes 40% cost share)

# Q & A

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