

Low Cost, Durable Seal

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LOW COST, DURABLE SEAL

Outline

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

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Project Objective

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

DOE Targets/Goals/Objectives	Project Goal
<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.

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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

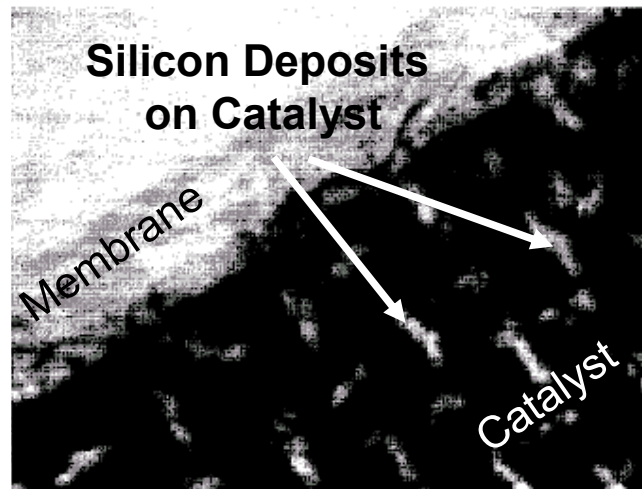
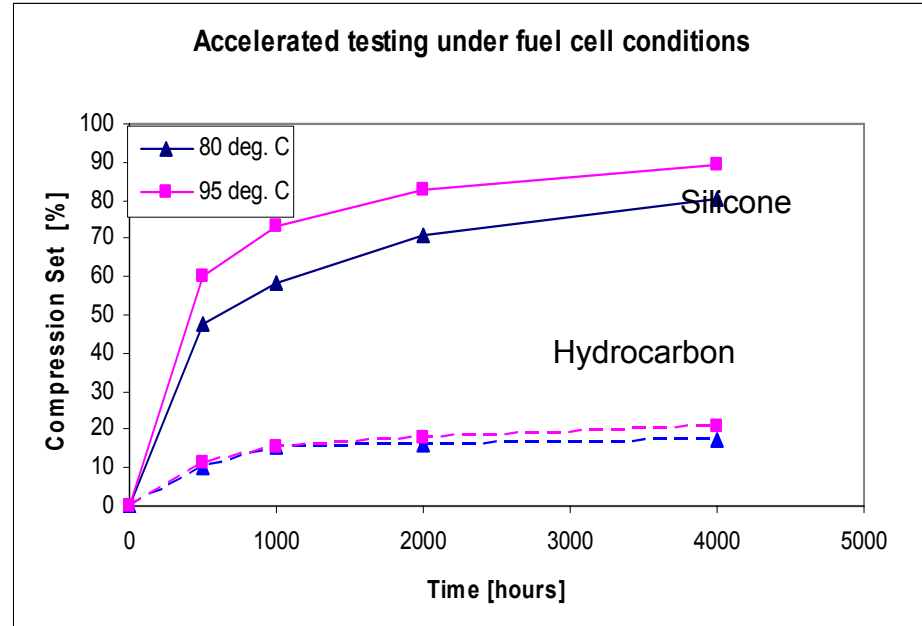
○ Fair

- Poor

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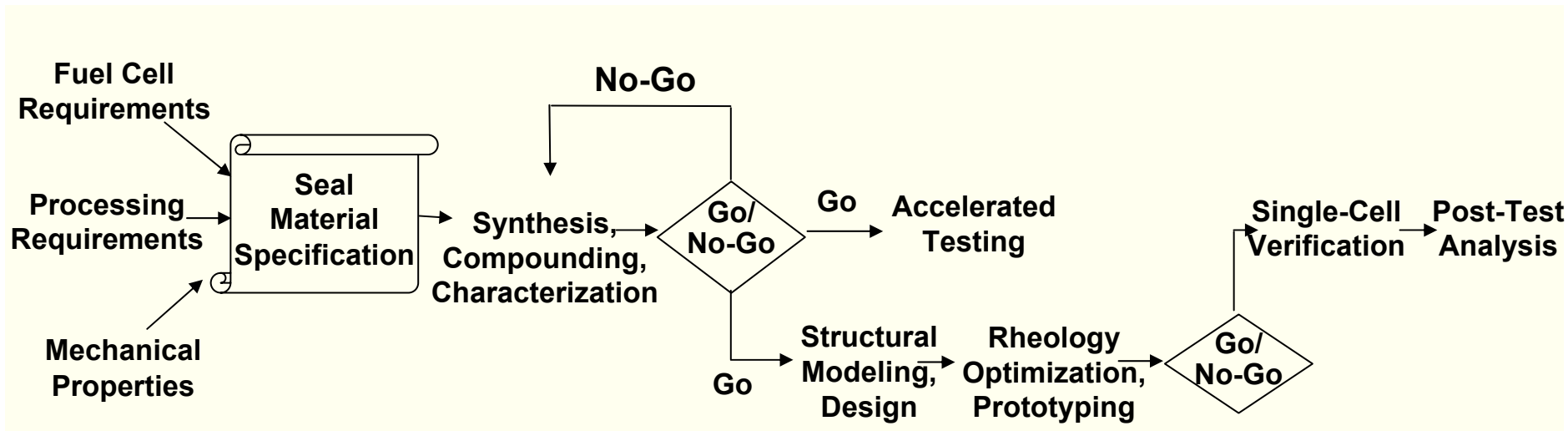
Project Approach - Background

- 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.



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Project Approach



Material Specification and Development

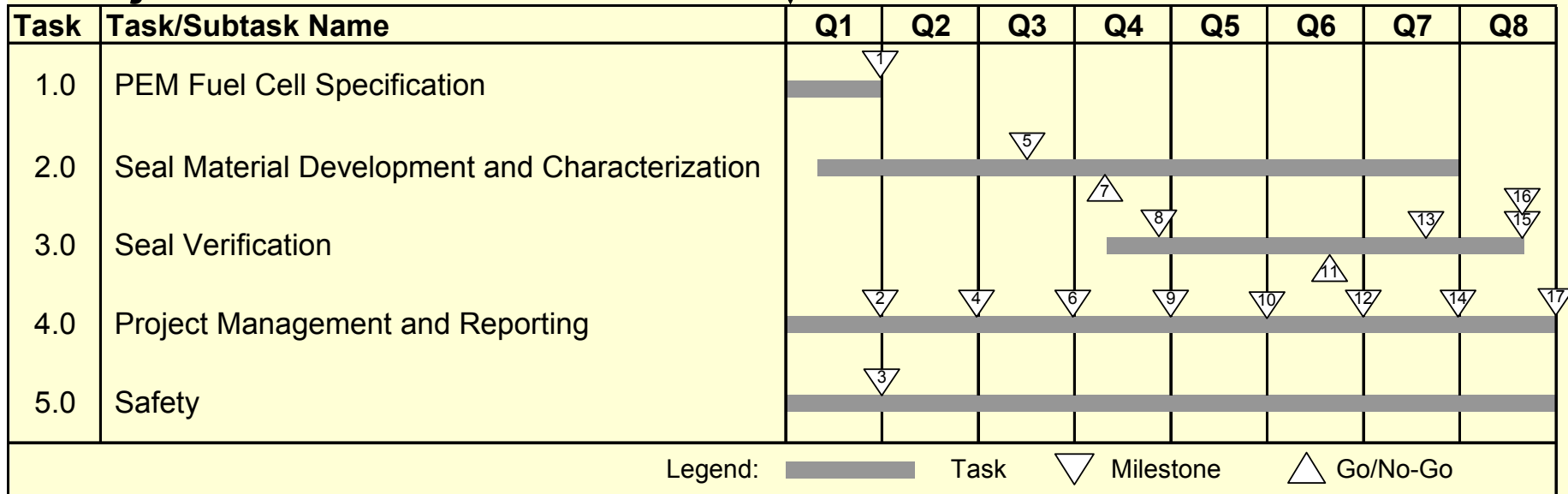
Seal Modeling and Prototyping

Single-Cell Verification

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Project Timeline

Start Date: 4/01/07



M/S	Milestone
1	Complete Seal Specification
3	Complete Safety Plan
5	Complete 1 st Round Synthesis and Characterization
7	Complete 1 st Round Material Screening
8	Finalize seal design
11	Complete 1 st 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

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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

