



# **DEVELOPING IMPROVED MATERIALS TO SUPPORT THE HYDROGEN ECONOMY**

**Edison Materials Technology Center**

May 23-26, 2005

Project ID# PDP57



# Objectives

Edison Materials Technology Center (**EMTEC**) will use, “Hydrogen, Fuel Cells & Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan” goals to find and fund projects with near term manufacturing based commercialization potential

Feasibility projects with job creation potential

Cross cutting breakthrough materials technology

Will use EMTEC Core Technology (CT) model

# Target Technologies

- Hydrogen Generation
  - Renewable liquid feedstock
  - Natural gas, water electrolysis
  - Photoelectrochemical
  - Separation Materials
  - Biomass, Coal et.al.
- Hydrogen Storage
  - Cross cutting novel approaches
- Hydrogen Processing
  - Sensors, delivery, purification



# EMTEC

- EMTEC is one of 7 State of Ohio Edison Centers
  - Established in 1987 by Ohio Gov. Celeste
  - 501c(3) Not for Profit
- Membership Based with Over 100 Industry, plus University, and Government Members
- Virtual – We Own no Major Capital Equipment
- Access to Over \$2B in State-Of-The-Art Facilities
- Significant Experience in Ceramics, Metals, Polymers, and many Material Processes

# Budget

- Total Funding: \$12 Million +
  - DoE share ~ \$ 6 Million
  - Contractor cost share > \$5 million
  - State of Ohio: > \$1 Million cost share
- FY04: \$2.945 Million
- FY05: \$2.961 Million



# Approach

EMTEC will solicit and evaluate projects:

Clear Project Definition

Industry Relevance

Appropriate Resource Level

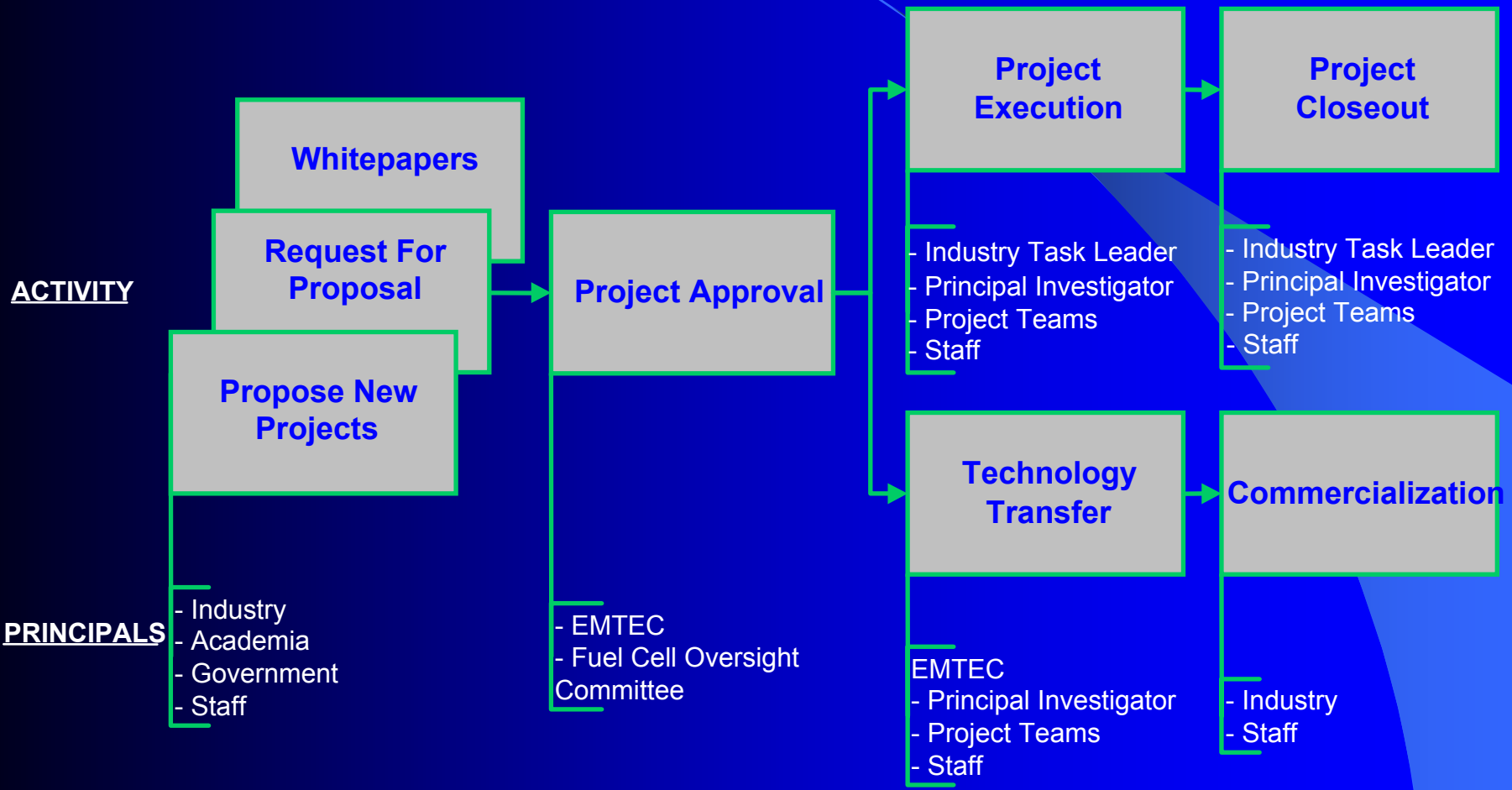
EERE Hydrogen Goal Alignment

Commercialization Viability

EMTEC has extensive experience managing technology projects

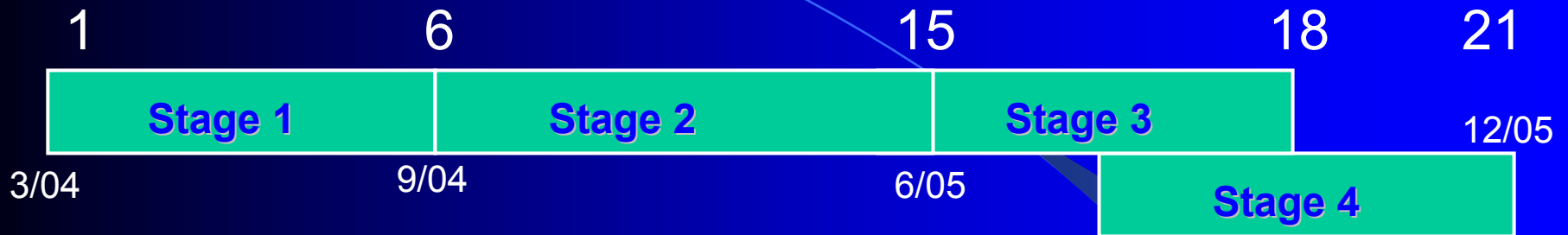
EMTEC has developed a business model for selection and management of core technology

# EMTEC Proposal Flow Chart





# FY04 Project Timeline



## Stage 1 – FY04

Solicit & Select projects with EMTEC RFP  
Complete FY04 DOE project application

## Stage 2 – FY04

Award phase I projects & solicit additional projects AR  
Monitor projects and Go/NoGo milestones

## Stage 3 – FY04

Down select projects based on phase I performance  
Select phase II projects based on commercialization potential

## Stage 4 – FY05

Initiate FY05 with new project solicitation & selection





# Interactions and Collaborations

- State of Ohio – Department of Development – Technology Division
- State of Ohio – Department of Development – Third Frontier
- USAF – AFRL Technology Transfer program
- Procurement Technical Assistance Center (PTAC)
- Manufacturing Small Business Development Center (MSBDC)
- Material Technology Liaison at AFRL
- Technical Steering Committee (TSC)

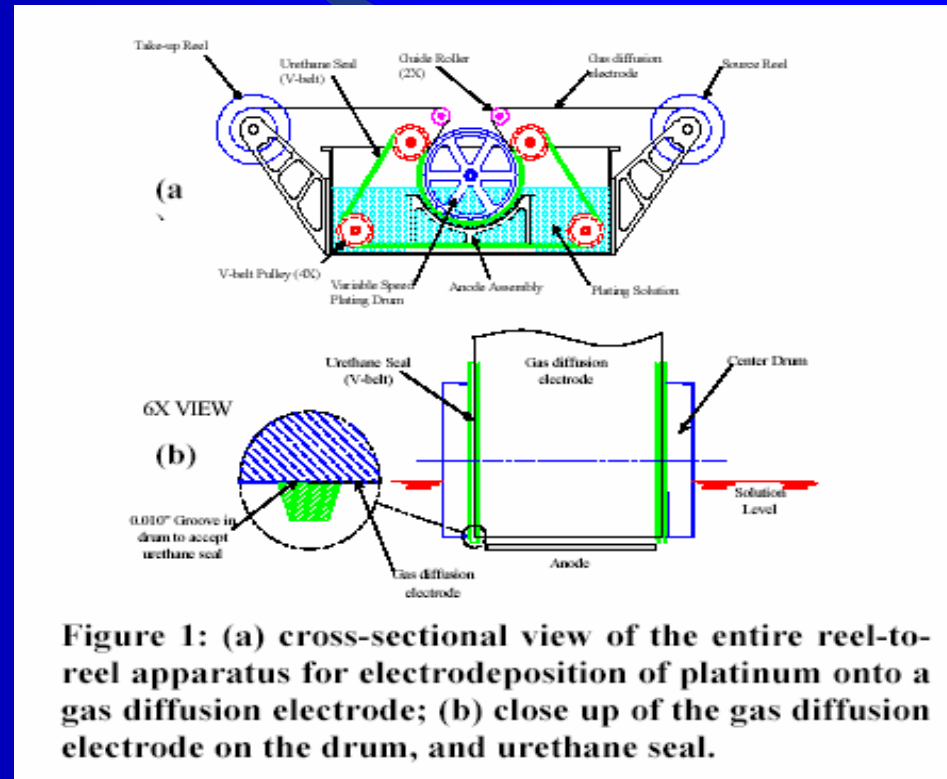


# Accomplishments/Progress

- Two rounds of proposal requests (2 RFP's)
- > 50 Proposals reviewed
- > 20 Site visits performed
- 13 Projects negotiated
- 7 Projects funded

# Nanocatalyst Development Employing Electrically Mediated Processing for Hydrogen Generation - FARADAY

- Total program award value of \$360,287
- A low-cost, mass production fabrication technology for catalyzation of membrane electrode assemblies (MEA) for PEM (Proton Exchange Membrane) electrolyzers and regenerative fuel cells
- Program will enable high cost electrode catalysts to be used more efficiently, reducing cost of MEAs



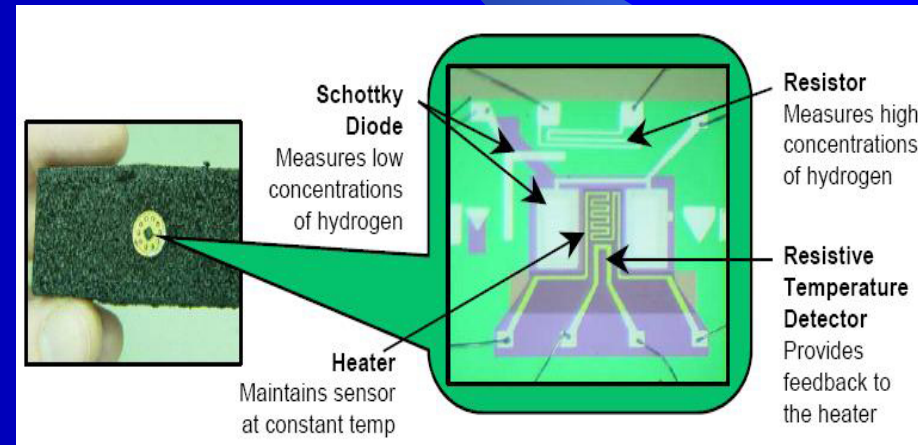
# Novel Spiral Stackable Reactor (SSR) for Low-cost Hydrogen Production - CATACEL



- Total program award value of \$234,352
- Novel Spiral Stackable Reactor (SSR) for low-cost stationary hydrogen production
- Intended to be a drop-in replacement for the loose ceramic catalyst media in the stationary steam reforming process

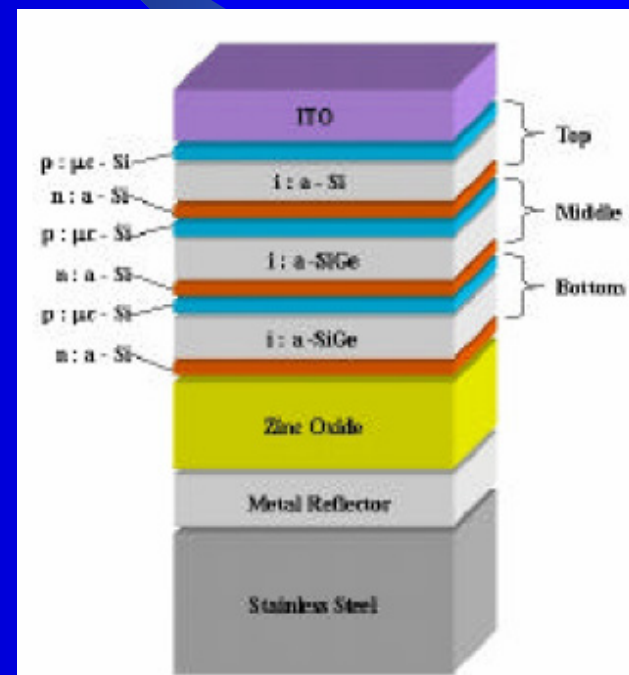
# Low Cost MEMS Hydrogen Sensor for Transportation Safety - MAKEL

- Total program award value of \$260,727
- Advanced hydrogen sensor system for hydrogen powered transportation applications
- Provides the means for low cost, compact, low power consumption, and miniaturized systems suitable for mass production



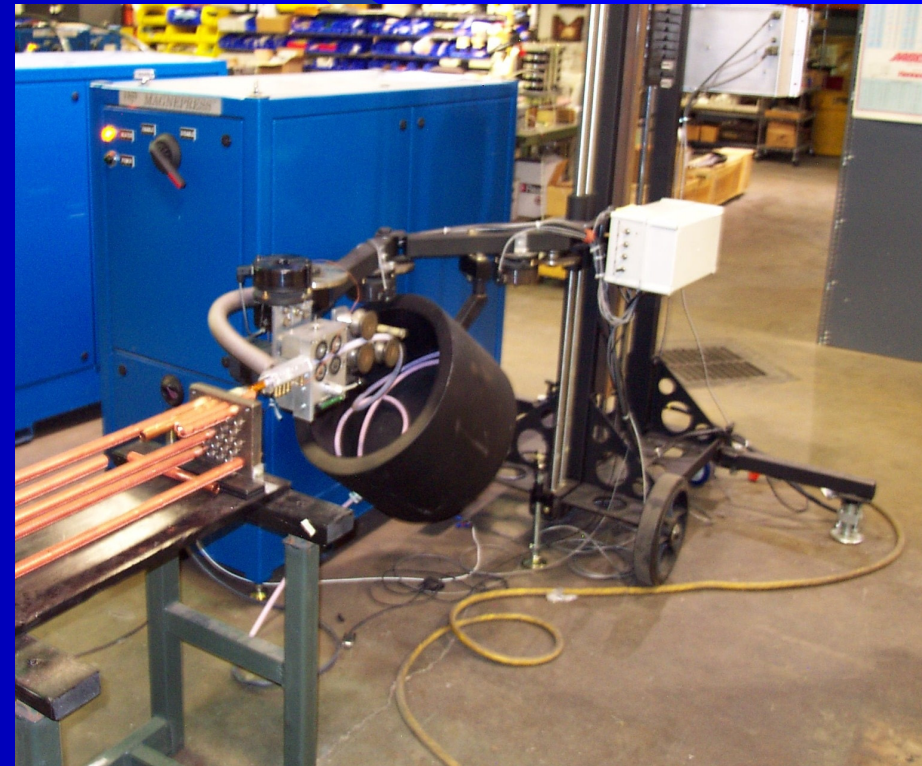
# Development of Improved Materials for Integrated Photovoltaic - Electrolysis Hydrogen Generation Systems - MWOE

- Total program award value of \$674,875
- Small scale manufacturing process for its integrated photovoltaic electrolysis (IPE) panel
  - This technology produces hydrogen from water using sunlight
- Collaborators on project include the University of Toledo, Energy Photovoltaic, Inc, and National Renewable Energy Laboratory



## Commercialization of EM Solid State Welding for High Pressure Hydrogen Storage - IAP

- Total program award value of \$324,769
- Electromagnetic (EM) solid state welding process
- Process will meet the requirements for future hydrogen storage applications



# Future Work

- Continue to monitor, manage and complete as scheduled and budgeted FY04 initiated projects
- Solicit additional projects with near term manufacturing based commercialization potential with an updated RFP
- WATCH for RFP: ~ August, 2005





# Conclusion

**EMTEC will have an ongoing award  
winning program with active DOE  
Hydrogen, Fuel Cells & Infrastructure  
Technologies Program advocacy**

# Project Safety

**EMTEC will require that project proposals for hydrogen-related technology include a preliminary safety plan.**

**All funded projects must complete a safety plan and report as part of the project.**