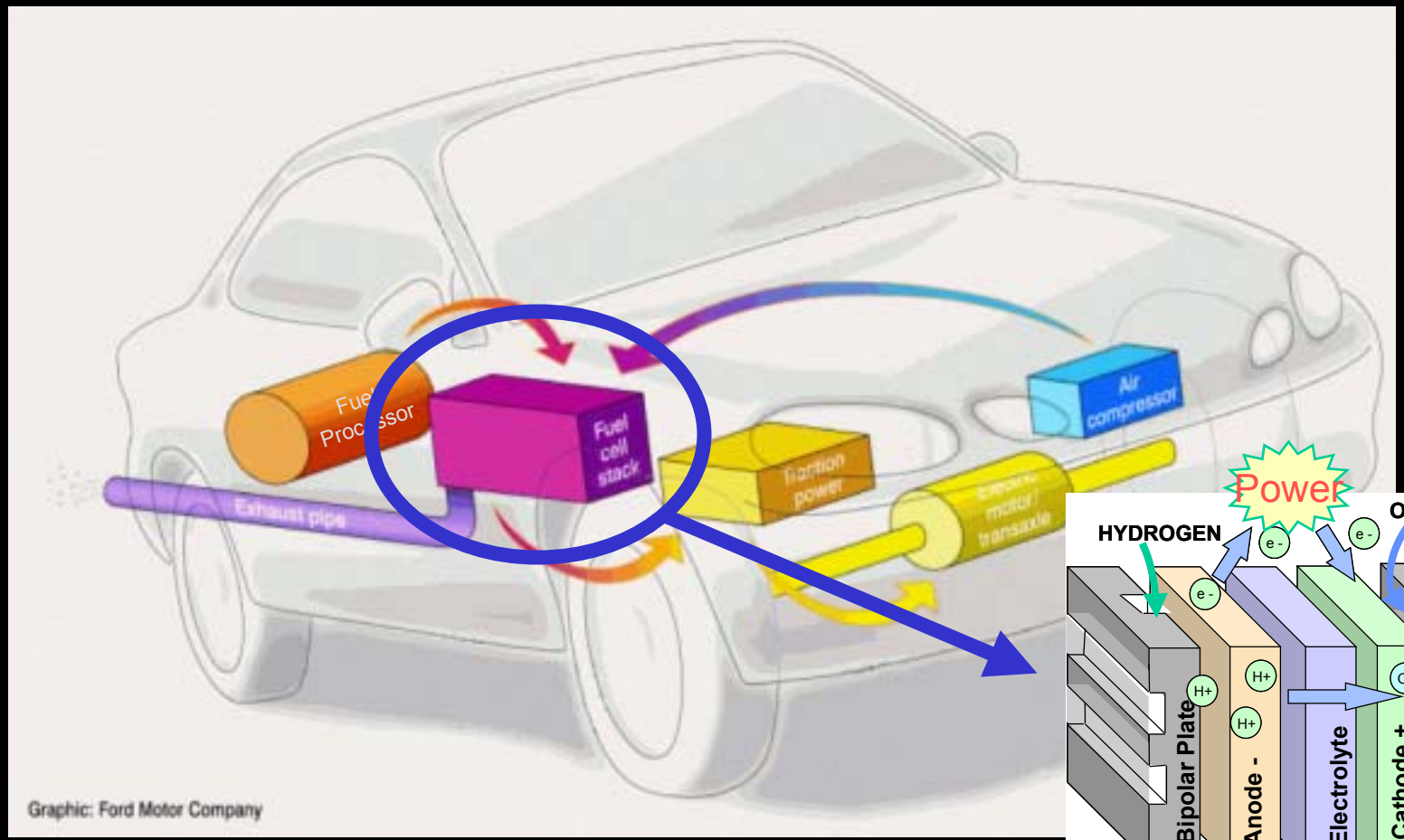
Materials



Nancy Garland

Targets and Status

Bipolar Plates

Characteristic	Units	Target	Status
Weight	kg/kW of system	<1	
H_2 permeation rate	$cm^3/s^1\text{-}cm^2$	$<2x10^{-6}$@80°C, 3 atm	$<<2 \times 10^{-6}$
corrosion rate	$\mu A/cm^2$	16	5-6 (C) 1 (nitride@0.9 V vs SHE)
conductivity	$1/\Omega$-cm	>100	200-300 (C) 10,000 (nitride)
cost	$/kW	<10	5.5 (C)

Materials Challenges & Objectives

Challenges

- Manufacturing processes
- Stack material cost
- Weight
- Cost vs performance
- Thermal/water management

Objectives

- Investigate and develop materials for low-cost, lightweight, corrosion-resistant, and impermeable bipolar plates
- Investigate and develop materials to improve heat transfer and reduce the size and cost of heat rejection components

Materials Projects

National Lab Projects

ORNL

- Carbon Composite Bipolar Plates
- Metallic Bipolar Plates
- Carbon Foam for Fuel Cell Humidification

ANL

- Low-friction Coatings for Fuel Cell Air Compressors

Industry Projects

Gas Technology Institute

- Development of a $10/kW Bipolar Separator Plate

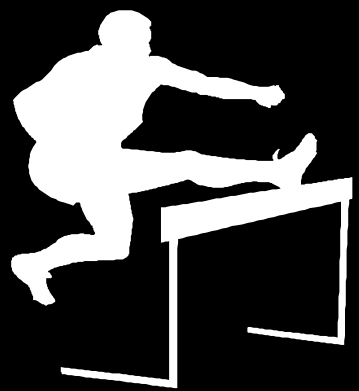
Porvair Corporation

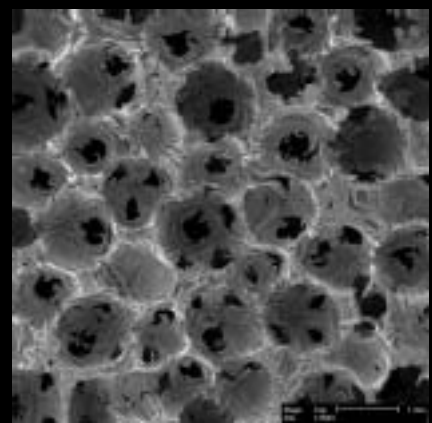
- Scale-Up of Carbon/Carbon Composite Bipolar Plates

Industry Interactions/ Technology Transfer

ORNL licensed bipolar plate technology to Porvair who will scale-up and demonstrate a pilot-plant facility

ORNL licensed carbon foam technology to Poco Graphite for large-volume applications





Discussion Points

Should the tech targets for bipolar plates be revised/updated?

How will raising the operating temperature of the membrane to 150°C affect bipolar plate performance and durability?